THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

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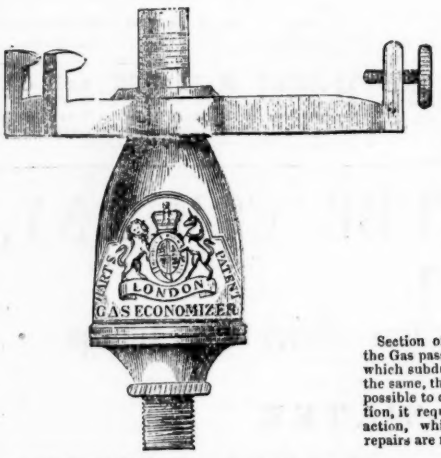

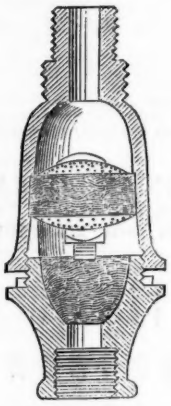

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ERRATUM.

Page 658, under the head of "Provisional Protection," to invention No. 1942, *for* "William Erson," *read* "William Esson."

NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing-Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, DECEMBER 7, 1858.

NOTES UPON PASSING EVENTS.

THE weather appears recently to have assumed the task of falsifying the conclusions, and of disturbing the averages, of the Registrar-General. Under the influence of the strange fluctuations of temperature of the end of November the public health, of the Metropolis especially, has suffered grievously; and much of the supposed improvement of the former part of the year has been counterbalanced by the sad increase of mortality which took place during the last two weeks. The moral we draw from this tale would be, that it is dangerous to talk of averages, unless they should have been derived from observations carried on for so long a period as to insure the requisite compensation for every possible source of error; and certainly we are also led to suspect that the assumed average rate of mortality of London, so ostentatiously paraded in official documents, is far from being a correct one. It is important to dwell on these illustrations of the unphilosophical character of the assertions of the Registrar-General, because there is a tendency on the part of our law-makers to accept, without challenge, the official statistics, which are thus shown to be incorrect: otherwise, the unaided effect of time might be allowed to reduce those statistics to their proper level. At present, the costly establishment of the Registrar-General's office is little better than a heavy burthen upon the taxpayers, for the sole purpose apparently of diffusing error; just as the late General Board of Health was an instrument for the propagation of the absurd fancies of Mr. Chadwick in engineering matters. The public generally, and all foreigners, are not, unfortunately, able to appreciate official science as it deserves; and it is, therefore, the duty of thinking men to call attention to its defects, whensoever they become manifest.

But the increased mortality of the last fortnight requires to be noticed for other reasons than merely to point the moral of the weekly tales told by the Registrar-General. The number of deaths from diseases connected with the organs of respiration has not, perhaps, assumed larger proportions than might naturally have been expected at this season of the year, and with the singular oscillations of the temperature; but the extraordinary prevalence of scarlet fever, and of some of the acute spontaneous diseases our authorities persist in calling *zymotic*, in spite of the protests of the most able foreign medical staticians, may well cause anxiety. Generally speaking, the scarlet fever, indeed, exercises its greatest ravages in autumn; the peculiarity about its actual prevalence lies in the fact of its occurring with a temperature such as we might expect to find in winter, and perhaps we may add in the occurrence of nearly as many cases, proportionately, in the country as in town. It would be extremely interesting and important to examine the influence of external causes upon these singular affections, and to endeavour to ascertain their nature and relative importance; but the tables of the Registrar-General are useless in these cases, for they are barely correct records of figures, without reference to the facts which ought to explain them. Surely, for instance, the geological character of the various districts must affect the mortality from peculiar diseases, yet no allusion is made to this potent agent; and again, it would be almost as important to know the number of persons attacked by a disease, as it would be to know the number of fatal cases—this, however, does not appear in the official returns. It may be said that English habits are opposed to the collection of statistics which would be so intimately connected with private life; but unless these studies are carried out to the utmost, they are only likely to mislead, and we therefore believe that the common sense of the whole business would be to put an end to the farce of the official records as they now exist.

Will any good ensue from the fine speeches, uttered in such haste by "starring" Lords, about the misery and crime produced by overcrowding the dwellings of the poor? Lord J. Russell has lately made himself conspicuous by advocating this portion of the cause of those who can so hardly help themselves; and he seems to think that a partial remedy is to be found in the construction of the Central Railway, whereby the poor are to be carried to and from their work to their suburban homes. But how strange it is that such great men should allow themselves to overlook the most elementary facts connected with the case before them! It cannot be supposed that even a "workman's train" could be run at less fares than a halfpenny per passenger per mile; nor could any workman's village be found within a less distance than four miles of the central station. The extra expense it would thus be necessary to incur would be equivalent to an increased rental of 2s. per week; and what compensation for this increase would exist? There is, however, a large portion of London itself wherein it would be possible to erect really model lodgings. We allude to the unoccupied, or underoccupied, parts of Southwark and Lambeth; and sure we are that the interests of the poor would be more effectually advanced by the abolition of the various Bridge-Tolls—which would bring those districts into the market, so to speak—than by any outlay for the purpose of providing them with suburban retreats, or bucolic beatitude. One thing is quite certain, namely, that in consequence of the marvellous concentration of business in the heart of the City, the value of land is increasing so rapidly that the poorer class of houses must be swept away, to make room for the gorgeous warehouses which are springing up on all sides. Where are the poor to go? how can their forced removal be made conducive to their real happiness? These are grave questions; and though we cannot agree with Lord J. Russell in seeing their solution in the execution of Mr. C. Pearson's last scheme, great praise is due to his Lordship for asserting, so warmly as he did, the necessity for a prompt and earnest effort to remedy the unequivocal evils both of the present state of the lodgings of the poor, and of the unsparing way in which they are now dispossessed of their old haunts, in order to make room for "improvement."

Amongst the other changes suggested in connexion with this said Central Railway, we observe that it was proposed that the skin market should be transferred from Leadenhall Street to this site. Such a course would, however, we are convinced, be objectionable for many reasons; and we there-

fore urge the Corporation authorities to pause ere they attempt to effect the alteration. Unquestionably the retention of the skin market, with its foul smells and revolting accompaniments, in the very heart of the City, is as great a disgrace to the Corporation as the present state of the London slaughter-houses; and it is, indeed, unaccountable that so great a nuisance should so long have been tolerated close to the East India House and the great mercantile establishments of the Metropolis. But if the market be removed, evidently it ought to be removed to a situation where it would be the least objectionable to the public, and the most convenient to the traders dealing in hides and skins. These conditions would be attained by transferring the whole of these operations to the new leather market, Bermondsey, in the very centre of the tanneries and other establishments for converting the raw materials directly they are sold, and in a neighbourhood already devoted to the unsavoury trades which must be carried on in every large town. There was, some time ago, a very strong feeling on the part of the leather trade of London in favour of the removal to the locality above suggested, and a deputation from them actually presented a memorial on the subject to the Markets Committee of the Corporation. Alas! even Municipal Corporations are at times exposed to the influence of the barnacles of red-tapeism; and so it would appear that the deliberately-expressed opinions of the parties most interested in this projected change are coolly to be set aside, in order to allow the amateur Engineers of the Corporation to carry out their crotchets.

The good people of Surrey and Sussex have suffered, apparently, in a very serious manner from the long-continued droughts, and water has become, upon the clay lands of the Weald, an article of a very different value to that which it has in the eyes of the parties who are so anxious to leave unchecked the waste so bitterly complained of by the Southwark Water-Works Company. From the peculiar geological constitution of this district some such result must have occurred, because the nearly impermeable nature of the surface stratum, and its great depth, must always prevent the rainfall from penetrating to any deep-seated springs. The rivers of the Weald are, indeed, for the most part, of what are called a torrential character—that is to say, they are full and turbid in winter and wet seasons, but mere driblets in dry weather. Recent agricultural improvements have, moreover, increased the practical inconveniences attached to such a constitution of the soil; for the great development of land drainage, which has lately taken place, has materially affected the power of the surface to cast off the rain directly it falls. The rivers of Sussex, at the head of the Weald at least, are, in fact, less constant in their volume than they used to be; and, as no comprehensive measures have been adopted to store the surplus waters of the rainy seasons, by the formation of large artificial reservoirs, there is a sad deficiency of water in dry weather. It is possible that in some positions in this valley, wells might be sunk with advantage, but no very successful operations of this nature have yet been accomplished. Moreover, there seems to be strong reason for believing that the axis of the Weald coincides with some great disturbance of the subterranean strata, and that therefore the ordinary laws of the supply of Artesian Wells are likely to be affected in this district. It is little to the credit of the inhabitants of this district that they do not take some steps to solve the important geological and commercial questions raised by Messrs. Godwin Austin, and Burnell, especially as by so doing they might at least discover whether there were any chance of obtaining water from deep-seated wells. To a great extent, however, the positive evil under which the dwellers around Horsham have this year suffered so severely, is within their own control, provided they would undertake a bold, comprehensive scheme for the improvement of the hydrography of the district. If they were not disposed to risk their money in sinking wells (a course which is indeed a rather doubtful one), they might still materially increase their resources for a water supply by some cheap and inexpensive earth-works above ground. Rain is falling as we write; so no doubt the agricultural mind will forget the evil of the past day, and allow the precious fluid to escape as it was wont to do. But surely the lack of water under which the south-eastern part of England, equally with the other countries of north-western Europe, has suffered this autumn must have affected the state of public health in these districts; and it would form an interesting subject for investigation to endeavour to trace the action and reaction of the recent atmospheric disturbances from the ordinary state. The results would probably startle the inhabitants of the Weald, and perhaps they would induce them to ask whether there would not be true economy in at once undertaking to seek a remedy against the recurrence of droughts, such as we have lately witnessed.

In our last number we alluded to the present state of the river Nene, as it has been rendered by the labours of modern engineers, and since then we have made further inquiries into the matter. At present these inquiries are far from being complete, but there is certainly before us ample evidence to show that, notwithstanding the greatness of the names which appear, the commercial and sanitary interests of this district have been very injuriously affected. It is startling, moreover, to find that such men as Mr. Stephenson should naïvely confess that he only looked to the improved discharge of land floods when he recommended the works of the lower part of the river; and that he required a practical lesson, of this description, to teach him that the tidal scour was far more powerful in its regular action than the land floods could be in their paroxismal violence. This we had always been accustomed to consider as an aphorism of Hydraulic Engineering; and there must be serious reason for apprehension, when the gravest interests of the country are left in the hands of men who have evidently so much still to learn. The manner in which Mr. Stephenson makes this strange admission (page 6 of his Report of July, 1858) would also lead to the inference that the Engineers whose labours he criticizes were not better informed in the matter than he himself admits that he was; and if this be true, what a commentary it is upon the state of Engineering science in England! But if we turn from this personal question to the consideration of the actual facts of the case, there seems to be only too much reason to believe that the Nene Valley has been made the subject of as inexplicable a course of empirical Engineering as it would be possible to conceive.

In fact, the Nene had, within a recent period, been so much improved, that the navigable channel, which formerly had a depth of only 17 feet at high water of ordinary spring tides, between Wisbeach Bridge and Sutton Wash, had, even before Mr. Rendel's late works were commenced, a general depth of 22 feet, at least, in the fair way at the above-named periods. Wisbeach Bridge acted as a dam to prevent the further unchecked progress of the tide-wave, and also to prevent the lowering of the low-water line; for the clear span of the bridge was only 70 feet, whereas the mean width below it was at least 150 feet. The consequence of the existence of this bar was to limit the range of tide to only 9 feet immediately above the bridge, and to raise the bed of the river abruptly about 7 feet. One of the first works executed by Mr. Rendel seems to have been to remove the old bridge, and to substitute for it a turning one, having a clear water-way of 100 feet. The natural consequences from such an operation have ensued: the tidal scour has been increased, and the bed of the river above the ancient bar has been lowered; but, as the works for the consolidation of the existing channel were not designed or executed upon any philosophical principles, the various structures upon the banks of the Nene, in the upper parts of the town of Wisbeach, are menaced with immediate ruin. The remedies now proposed for this state of things, which any tyro in engineering ought to have foreseen, are either to stop any further improvement in the navigation of the outfall by arresting the upward progress of the tide-wave, or to form a new channel wherein the uncontrolled action of the laws of hydrodynamics would allow the river to create, as it were, for itself a normal regimen.

Theoretically, there can be no doubt as to the proper course to be adopted. A new channel must be cut for the river, if it be desired to develop the commerce of Wisbeach and to render the navigation of the tidal portion as secure and advantageous as it might very easily be made. But the precise direction of this channel cannot be settled without long and patient investigation of the value of property in the neighbourhood, and of the rights of the holders of long-established water privileges, who are likely to be affected by any change in the actual state of the river. The project for at once stopping the further progress of the tidal wave is so monstrously absurd that it could not for a moment be entertained, if our Admiralty authorities knew, or would perform, their duties. From the evidence of Sir J. Burgoyne before the Tidal Harbours Commission, we suspect, however, that it is necessary to question both the extent and the character of official science; but between

these various dabblers in Hydraulic Engineering, Wisbeach bids fair to be seriously and permanently injured.

The proceedings in the case for winding up the Woolwich and Plumstead Water-Works Company, and in the case of the Wolverhampton Water-Works Company *v.* Holyoake, do not show favourably for the commercial morality of the speculators who have recently entered upon this particular class of operations. It is unfortunate that these things should occur, for they cast discredit upon operations which are of the greatest importance to society, though it is very rarely that they are the sources of great profit for their originators. The parties who have figured in the cases above mentioned seem to have forgotten, or to have ignored, this fact; and they have apparently introduced the "easy" morality of Railway speculators into the management of concerns which can only thrive on the condition of their being economically and rigidly conducted. So long as human nature is human nature, however, these things will occur, and some men will seek rapidly to acquire wealth without reference to the means they adopt. Our duty as journalists is, simply to call attention to the existence of what we consider to be the dangerous practices of our usual clients, and to protest against them when they are likely to injure the interests of the public or of our clients themselves. But we cannot here refrain from saying that the Water Companies might take a higher position in public estimation than they actually do, and their shareholders would be more efficiently protected than they now are, if greater publicity were given to the proceedings both of their meetings and of their officers. As it is, there is a ridiculous dread of discussion prevalent amongst the directors of those bodies; and no attention can be called to the existence of any wrongheadedness or jobbery until it is too late. The disclosures in the Woolwich and Wolverhampton cases certainly induce us to ask whether affairs would have gone to the sad extent they did, in either of them, if the shareholders had been aware of the real state of their property?

We must take this opportunity of complimenting the Metropolitan Board of Works on the accession to its influence it has lately received, by the election of Mr. Tite, M.P., to the seat vacated by Mr. Francis. Perhaps a little more energy, activity, and scientific skill will thus be infused into the Board, which appears certainly of late to have lost much time in recruiting its strength after the arduous struggle with Sir B. Hall and the centralizers.

The case of *Skaife v. Daukes*, lately tried in the Court of Queen's Bench, is a curious illustration of the facility with which the Crown-appointed and irresponsible magistrates will at times allow themselves to become the tools of their own servants. It appears from the evidence, as commented upon by Lord Campbell himself, that the prosecution of Mr. Daukes was utterly groundless, and that it originated solely in an ungenerous and unjust attempt, on the part of Mr. Lewis Cubitt, to supplant Mr. Daukes in his official capacity. Lord Campbell smoothed over, as well as he could, the discreditable credulity of the Magistrates, and the sharp practice of which some of their other servants were guilty, in order to throw all the blame on Mr. L. Cubitt; but the ratepayers are entitled to ask for a more satisfactory explanation of the motives and conduct of these proceedings than has yet been afforded. It is disgraceful that a body of Magistrates should be able to waste the public money in a prosecution supported only by the assertions of one interested party; or that their immense power should be brought to bear against the reputation of any single man, upon the evidently false and unfounded assertions of his professional rival. The Magistrates themselves ought to be made to pay the costs of the action, and any damage due to the man they so "ungenerously and unjustly" attacked. Mr. Daukes merits the thanks of the profession for his boldness in resisting the overwhelming force brought against him; and he left the Court with a brighter and better reputation even than he had when these sad proceedings were begun. As for Mr. L. Cubitt, he may be left to ponder over the remarks of Lord Campbell and of the Jury; and to the pleasing reflection that he has been defeated in an "ungenerous and unjust" attempt to supplant a brother professional man.

The French papers record a singular accident, which has lately deprived the technico-scientific world of one of its brightest ornaments. A stray splinter from some experimental shell struck General Ardant, a few days since, at Vincennes, and thus, in a most extraordinary manner, at once extinguished one of the brightest intellects of the age. The work published by the (then) Colonel Ardant, 4to, Paris, 1840, under the title, "*Etudes Théoriques et Pratiques sur l'Etablissement des Charpentes à Grande Portée*," is one of the finest works upon Carpentry with which we are acquainted; and it is fearful to contemplate that such men as its authors are at the mercy of the slightest accident equally with a sparrow. Truly, in the midst of life we are in death!

Circular to Gas Companies.

The delegates from the metropolitan vestries to the gas-reform congress of Marylebone appointed a deputation from their body during the last parliamentary campaign to take charge of their case, and abandoned to them their delegated duties. These valorous deputies have now rushed into print. They have published a declaration of rights and wrongs, they have laid bare their plan for the ensuing campaign, and they appeal to the pockets of their fellow-citizens for support. A large portion of their long-winded blast of defiance to the gas companies of the metropolis will be found in another part of the Journal, and justice requires us to say that the blast is strong as well as long. Their courage, which had almost oozed out at their fingers' ends by the damaging evidence and cross-examination of the witnesses before the parliamentary committee, has come back to them during the recess, and—"odds triggers and flints!" as *Bob Acres* would say—they now look as valiant as the British lion rampant.

The past, present, and future come within the scope of the report of the managers to the general body of delegates, which commences with the old story that the gas companies of the metropolis were established on the principle of competition, and that that principle has been subverted by the districting arrangements. It then proceeds to notice the alarm of the gas consumers on being thus bound hand and foot, to be dealt with as the companies might think fit, to show the advantage that had been taken in one instance of their helpless condition, and to picture the dreadful state of oppression to which they might be subjected. The proceedings of the delegates, shorn of their bombastic eloquence and of most of their fallacious and absurd representations, are duly set forth, and the managers are bold enough to review, though very briefly, the proceedings before the committee of the House of Commons. The miserable failure of the attempt to prove a grievance by the evidence of Dr. Challice and Mr. Slee is scarcely denied, but it is attributed to the wrong-headedness of the Southwark grievance-mongers in persisting to act independently of the general body. The admission that "it is possible, had the opportunity been given to revise or *rehearse*, that some of the evidence, which was perhaps too zealously prosecuted on the part of Southwark, would have been withheld," seems intended to throw overboard Mr. Slee's schoolboy experiment with a pound of coal, made "once upon a time," which was brought forward as a damning proof of the low cost at which millions of cubic feet of gas can be manufactured, purified, and distributed. But the truth, it is observed, "often lies enveloped in much that is useless and irrelevant," from which we are led to infer that "the allegations which composed the bill of indictment introduced by Dr. Challice" against the metropolitan gas companies, were altogether ignored by the contradictory, absurd, and irrelevant statements of himself and his experimental coadjutor. Not, indeed, that the managers draw that inference, but it is the only inference to be drawn by a common-sense interpretation of the evidence; for when parties applying to Parliament for the remedy of a grievance admit that they were ignorant that they already possess the remedy they apply for; when they assert that the grievance they complain of is a public benefit; and that the competition which is sought for would be a serious injury—all of which was admitted by Dr. Challice—they cannot expect much sympathy from the Legislature, and a bill of indictment so supported would be instantly thrown out of any court.

The only thing that prevented the Bermondsey grievance from being altogether laughed out of the committee was the evidence of Mr. Crosley as to the registration of meters, and that gentleman, it seems, is to be made a great gun in the forthcoming campaign. But when it is recollected that Mr. Crosley expressly exonerated the directors of the metropolis gas companies from any participation in or knowledge of the imperfect registration of the meters, his evidence will not avail much in attempting to prove them guilty.

The managers have had more time to make out their case,

to prepare evidence, and to "rehearse" their performances' than was allowed to Dr. Challice; and, warned by his failure, they intend to proceed with greater prudence and more systematically. They have called to their aid Mr. Cleminshaw, the engineer of the Manchester Corporation Gas-Works; and Mr. Leigh, the chemist of that city, is also to render his assistance. Those gentlemen, no doubt, will give valuable information on various matters relating to the supply of gas, and they may probably mention, among other things, that the majority of the gas consumers of Manchester are paying to the corporation of that city 6d. more per 1000 cubic feet than is now paid by the much injured and greatly complaining gas consumers of London. It appears also that a series of experiments has been made or is to be instituted on the public lights, for the purpose of proving "enormous impositions in the public lighting." The street lamps, it seems, are to be the special objects of attack, to prove by actual experiment the truth of Mr. Hughes' former statement, that the most profitable portion of the business of gas companies is the supply of the public lights. To enable the managers to ascertain the amount of pressure in the mains at different times of the day and night, the quantity of gas consumed in the lamps, and its illuminating power, it is proposed to appoint in each parish a commission of *savants*, to be composed of the parish surveyor, a gas-fitter, and "several ordinary day-labourers." By this scientific staff questions are to be determined respecting the passage of gases through pipes upon Mr. Arntz's newly propounded theory, that "the volume of gas passed in a given time through a given orifice is greater or less *as the pressure to which it is subjected*," and its illuminating power, which other less venturous experimenters might scarcely like to undertake under such difficult circumstances.

Fallible men, like Dr. Leeson, Dr. Letheby, and Mr. Warington, may differ in the results of their photometrical measurements, and as to the mode in which the experiments should be conducted—their opposite opinions respecting the effect of blackened walls and obstructing screens serving to show that the determination of the illuminating power of a gas-flame is with them a matter of uncertainty and doubt; but all such doubts must surely vanish when the matter is taken in hand by men so skilled in conducting delicate scientific experiments as parish surveyors, gas-fitters, and "ordinary day-labourers." When those learned Thebans bring their powerful intellects, and skilled knowledge, and sinewy muscles to bear on the question, we shall hear no more of discrepancies amounting to 25 per cent. in the measurement of the illuminating power of the same gas, as reported in the recent arbitration case between the Great Central Company and their contractor, and such strange anomalies as differences of 50 per cent. caused by traversing a few hundred yards of main will cease to appear in our JOURNAL. We may feel satisfied that in the reports of the parochial *savants* there will be a stereotyped uniformity, bringing the illuminating power of the metropolitan gas companies below the required standard. It would be presumptuous to attempt to bear up against the overwhelming weight of such authorities, but as the managers of the gas agitation have published their programme for the forthcoming session, it is possible that the gas companies may endeavour to repel such an attack by presenting reports prepared by men who, if less bold and not so unanimous, may be individually better known and more experienced in scientific experiments than "ordinary day-labourers."

Pending the appointment of the parochial gas-testers, reports have been obtained from one parochial surveyor and from Mr. Hughes, one of the honorary secretaries of the managers, and the gentleman who, as before mentioned, maintains that the gas companies derive more profit from the public lights than from private consumers. Mr. Hughes has contrived to bend his facts to suit his opinions, and the parish surveyor, acting upon "a plan suggested by Mr. Hughes," has managed to attain the same results. They thus make it appear that little more than half the stipulated quantity is supplied to the public lights, and that in some cases the price paid for the gas consumed really amounts to 10s. 2d. per 1000 feet! That *would*, no doubt, be a profitable contract to the gas company, but as the stated price is based altogether on the experiments and calculations of the parish surveyor, the shareholders must not be too confident of its realization. The attempt to prove so much serves but to show on what a fallacious basis the calculations have been founded. It is absurd to take a few lamps, specially selected for the purpose, and to attempt to arrive at conclusions respecting the average supply in a whole district by a few isolated instances, even assuming—which is a large assumption—the measurements to have been accurate. It is well known that the pressure given by all gas companies in the mains varies at a distance from the gasholder from that at the works. Some of the London companies have to give an initial pressure at their works varying from 1 inch to $3\frac{1}{2}$ inches in order to obtain a uniform pressure of $\frac{6}{10}$ths of an inch at their lowest or most distant point of supply. We have recently been conducting a series of experiments in a situation nearly three miles from the source of supply, where the pressure has been about $\frac{8}{10}$ths of an inch from midnight till shortly before sunset, and has ranged from $\frac{1}{10}\frac{8}{0}$ths to $\frac{11}{10}$ths between sunset and midnight. Under these pressures a burner, the cock of which was not touched during the whole twenty-four hours, consumed gas which, when reduced to an average of 5 feet per hour, gave a maximum hourly consumption of 9·43 feet, and a minimum of 4·07 feet. On these data a lamp consuming 5 feet per hour at the minimum will consume 11·58 feet per hour at the maximum, and the mean consumption will be 6·12 feet. The nearer the place where such experiments are made may be to the sources of supply, the greater will be the range of variation in the consumption of the public lights; and if the local authorities will insist upon a minimum of 5 feet per hour, they must pay for an average of upwards of 6 feet. Unless, therefore, Mr. Hughes and his scientific parochial commissions can discover the means of so regulating the supply, that it shall be the same at all distances and under varying pressures, differences in the lights must necessarily exist; and in the mean time the public must rest satisfied if the gas companies fulfil their contracts with the vestries by giving the average supply, as equally distributed as circumstances will permit.

The courage of the managers of the gas movement seems to wax stronger as the impression of the ludicrous exhibition they made in the committee-room becomes weaker, so that the conditions proposed by them in June last, as amply sufficient for the removal of their grievances, seem now to be very inadequate to give satisfaction. They then recognized a dividend of 10 per cent. as not unreasonable, but now the ruinous state of railway affairs is adduced as an example of the dividends to be received by other public companies; at that time, too, 4s. 6d. per 1000 feet was the maximum price they were willing to pay for 12 sperm-candle gas, but 4s., and even 3s. 3d., for public lights are spoken of at the present time.

The prospects for the future are represented to depend altogether on the money provided. Give the managers plenty of cash, and they will do wonders. They ask only for "several thousand pounds," which may be raised by a rate of one farthing in the pound; and for so trifling a contribution they promise to save their fellow-citizens no less than £500,000 per annum; which amount—being the increase upon the present charge of £1,000,000—they have ascertained the gas companies will impose if not successfully resisted. With several thousand pounds in their pockets, the managers promise to get up a mass of evidence, in addition to that of the ordinary day-labourers, to satisfy the natural desire of the parliamentary committee to know whether there is really anything to complain of. It only requires money and able assistance, and the thing will be done. Half a million sterling per annum for a mere nothing! who can refuse to contribute? Send the hat round, "it's only a farthing in the pound, your honour."

We now approach a much graver subject. The discussion which took place in the Manchester City Council on the 1st instant on the subject of gas-meters (a full report of which is given in another column), will create a profound sensation throughout the country, as it has already done in the manufacturing districts of Lancashire and Yorkshire. It is not in our province as journalists to pronounce any opinion upon, or to interfere in, the squabbles of rival meter manufacturers; they must each fight their own battles in the way which they believe will be most advantageous to their interests. Our duty is to give to each "a clear stage and no favour," taking care, as far as we are able, that our columns are not abused by being made the vehicle for launching slanderous accusations, without giving the accused an opportunity of rebutting them. The position of the matter now is painfully complicated by the indiscreet zeal of the parties concerned—Mr. Crosley on the one side, and the gas committee on the other. Honoured names, the bearers of which would revolt at the bare idea of being used as the instruments for inflicting a fatal wound in the dark, even upon an enemy, have been imported into the dispute, and an

amount of bitterness has been engendered which some very wicked people think is indicative of the repetition of the well-known Old Bailey practice, "No defence—abuse the prosecutor." We earnestly hope it may not prove to be so, and that means will be taken to solve the difficulty by a tribunal which will command the respect and merit the confidence of all parties and of the public. The Imperial Parliament sitting at Westminster will doubtless soon relieve the local parliaments throughout the country from the necessity of further interference on this subject, by placing the control of gas-meters under some recognized authority; and in the mean time we strongly urge all to forbear from further embittering the existing disputes.

This matter as it now stands presents, however, a striking instance of the dangers incurred by persons who fill official situations, and who have important interests committed to their charge, by any interference in controversies which are extraneous to their legitimate functions. In the bloodless contests of trade, as well as in the sanguinary wars of nations, the strife is often transferred into the territory of allies, and the battle-ground becomes thereby largely extended. There are always "free lances" enough to be enlisted in any cause, without calling in the aid of those whose duty and whose interest require them to be neutral.

We understand that a second summons has been issued by the Lambeth County Court on a new plaint lodged by Spratt against the South Metropolitan Gas Company, for refusing to supply him with gas without first giving them security for the payment of the value of gas consumed, and that, after hearing both parties, an order was yesterday granted by Baron Channell, in virtue of which the matter is transferred by *certiorari* to the Court of Exchequer, leave being given to the defendants to state a special case for the opinion of the judges, the costs incurred to abide the event.

Correspondence.

ARNTZ'S REPORT ON THE PUBLIC LIGHTS IN WESTMINSTER.

Sir,—If Mr. Crosley, in his letter to you of the 19th of November, had confined himself to stating that he took no part in the experiments made on the consumption of the Westminster street lamps, I should have left his assertion unnoticed, as no one, so far as I am aware, ever said that he *did* take any part in those experiments, or ever asked him to do so.

Mr. Crosley, however, seems anxious to show that he was prevailed on with great difficulty to grant the use of his apparatus.

This I most distinctly deny, as Mr. Crosley over and over again voluntarily offered every facility his works and apparatus would afford for trying any experiments on the gas supplied by any of the London companies.

To say that he lent his apparatus on the strength of a representation by me that another manufacturer would have done so, except for his connexion with one of the metropolitan companies, is simply absurd. I never made any such representation, although I very possibly may have said that I should have applied to Mr. Wright for the use of the apparatus, had he not been the engineer of the Western Company. More than this I am quite confident I did not say; but, in truth, Mr. Crosley needed no persuasion, as I have hinted already.

I hope he is not now changing his colours after the chivalric manner in which he came forward to assist the parishes. I hope this for his own sake, as on him alone would rest the shame of such a desertion.

Samuel Hughes.

14, *Park Street, Westminster,*
Nov. 30, 1858.

MR. WRIGHT'S REPORT ON THE MANCHESTER METERS.

Sir,—My attention has been called to a letter of mine to Mr. Cleminshaw of the 9th of September, which is published in a document issued by the gas committee of the city of Manchester, a paragraph in which stands as follows:—"I have therefore manufactured and used such meters only as it was impossible to overfill in this manner." This should stand—"I have therefore, *for several years*, manufactured and used such meters only as it was impossible to overfill in this manner." You will oblige me by inserting this correction in the next number of your Journal.

A. Wright.

55 and 55 A, Millbank Street, Westminster, Nov. 3, 1858.

[We have delayed the publication of this letter, in the hope that the rectification of the error in question contained in our notice of the original letter on the 9th ulto, would have rendered all further reference to the matter unnecessary; but, as the error is again repeated in the discussion which took place in the Manchester City Council on the 1st inst., we deem it right now to publish the letter, with this explanation of the reason why it has been delayed. —Ed. J. G. L.]

Register of New Patents.

1099.—Charles Weightman Harrison, of Woolwich, in the co. of Kent, civil engineer, for "*Improvements in obtaining light by electricity.*" Patent dated May 17, 1858.

This invention relates to the use of mercury or other fluid, or some fluid body, as one or more of the electrodes in obtaining light by electricity, and comprises—

1. The employment within the lamp of a burner or tube, formed of a suitable material in any convenient shape or dimensions, and in feeding it by means of feeding arrangements with a supply of the fluid electrode, so that it shall remain full, or nearly so, during waste or consumption by the light.

2. In controlling or regulating the supply of fluid electrodes by means of a tap or other like agent, worked by electric action.

3. In forming a fluid positive compound electrode by dividing the stream, so that a number of separate lights may be produced from it in place of one light as heretofore. By these means the magnitude of the centre, or focus of light, may be increased to any desired extent.

4. In maintaining, by self-acting means, a constant degree of separation between the point where the stream of one electrode breaks, and the reservoir of a second electrode into which the stream falls or forms contact. This is accomplished by connecting or suspending the reservoir of the second electrode to a float which is placed on the first electrode, contained in another reservoir from whence the stream issues, whereby, as the float descends, the second reservoir is advanced in exact proportion to the length which the stream is diminished by reduced pressure. The same object is also effected by causing by any suitable arrangement the waste or condensed mercury, or other fluid forming a descending stream electrode, to elevate the lower electrode or reservoir. This may be conveniently done by placing it on a float under which such waste fluid is allowed to collect.

5. In forming the reservoir for holding fluid electrodes of a combination of lampblack or other form of carbon and silica, or of lampblack and china clay, rotten-stone, or other highly infusible material.

6. In preventing the condensation of vapours upon the glass or case of electric lamps by means of a stream of water or other liquid, or air, being made by any convenient arrangement to flow over or upon the interior surface of the glass or case. Also by partly or wholly filling the glass or case with water, alcohol, bisulphuret of carbon, or other suitable liquid, and in causing it to circulate around the light, or to pass away through apparatus by which it may be filtered, and then returned to the lamp again by a pump or other means, which may be worked by electric action.

7. In preventing the rise of vapours from the waste fluid of electrodes by the introduction of a stratum of water or other liquid into the waste-pipe or reservoir.

1107.—Alexander Angus Croll, of Coleman Street, London, engineer, for "*Improvements in the treatment of sulphate of alumina and in obtaining alum.*" Patent dated May 18, 1858.

These improvements relate to the means of preparing uncrystallized sulphate of alumina. In the preparation of such sulphate of alumina, as small a quantity of acid (oil of vitriol) as possible is employed, and any remaining free acid or decomposed salt of iron which it may contain is neutralized by adding to the preparation soda or potash in an alkaline state, and in the proportion of one-fifth of the resulting quantity obtained. Heretofore alum has been produced by a combination with the sulphate of alumina of either sulphate of ammonia or of sulphate of potash in certain proportions adapted to produce the best crystals.

These improvements consist, secondly, in substituting for the sulphate of ammonia or potash thus employed sulphate of soda, as a much less costly article, and only using a small proportion of sulphate of ammonia or potash. For this purpose, in place of the quantity of sulphate of ammonia or potash usually employed, a proportion of sulphate of soda equal to about one-fifth part is used, and four-fifths, or thereabouts, of sulphate of ammonia or potash is added to make up the quantity.

1117.—Charles Middleton Kernot, of Gloucester House, West Cowes, Isle of Wight, M.D., for "*Improvements in distilling shale, Boghead, and other mineral matters.*" Provisional protection only obtained. Dated May 19, 1858.

This invention has for its object improvements in distilling shale, Boghead, and other mineral matters. For this purpose the upper part of the retort or still is formed with an outlet leading to the condenser, and opening at top with a cover, and also a side passage or opening with a cover. Between the head or top of the retort or still is introduced a partition, consisting of two perforated plates, between which, when first distilling products from shale, Boghead, coal, or other minerals, are placed powdered coke and sand, in layers, through which the evolved products pass and are filtered in their way to the head and thence to the condenser. When redistilling products, such as naphtha, oils, hydro-carbons, and others, from mineral matters, then the still-head is formed at the upper part of a pipe or neck, the lower part of which descends some distance into the still or retort, but so that such lower end comes above the charge of fluid in the still or retort. Around the upper end of this neck or pipe is formed a gutter or hollow channel, into which the condensed products in the head descend, and are thereby prevented flowing back to the still or retort, but are carried off with the gases or vapours to the condenser. In the pipe or neck is formed a partition, consisting of two perforated plates, between which are placed matters suitable for acting on the passing products in a chemical or mechanical manner, so as to filter such products, to arrest impurities, and produce chemical changes.

The matters which are generally used are black oxide of manganese, sulphate of iron, chlorate of potash, bichromate of potash, and others, according to the action desired to be produced on the products as they are distilled over. These matters are placed in layers between the perforated plates of the partition.

1145.—Frederick George Underhay, of Wells Street, Gray's Inn Road, and Josiah Latimer Clark, of Haverstock Hill, Hampstead, London, for "*Improvements in cocks or taps, and in apparatus for flushing.*" Patent dated May 22, 1858.

This invention has for its object improvements in cocks or taps and apparatus for flushing. For these purposes, in constructing ball and other cocks, means are provided for the passage of water from the face of the valve which closes the water-way or passage, to the back of another valve or piston, so as to produce more or less complete an equilibrium in regard to the pressure of the water. Through the stem of the valve there is formed a small passage, and at the further end of the valve-stem is formed or affixed a piston or valve, which in one arrangement is a cupped leather or a cup of suitable flexible material, and such piston moves in a cylinder formed on the cover of the cock; and in another arrangement a flexible diaphragm or partition is used, which is fixed at its centre to the valve-stem, and at its periphery or circumference it is fixed between the body or barrel and the cover of the cock, the stem of the valve, as in the other arrangement, having a small water passage through it. In constructing apparatus for flushing water-closets, urinals, and other places, the outlet of the water cistern is covered with a valve, to which is attached a float by a chain or suitable connexion. The valve is arranged to open on an axis and arm or lever, by which it is moved away from its seat and allows a free passage of water so soon as the height of the water in the cistern causes the float to rise and float. It is preferred that the float for this purpose should be conical, and that it should float on its side, but assume a vertical position when the valve is closed. It is not essential that the float should be conical, or that only one float should be used for each valve, nor is it essential that the valve should open on an axis, as in some arrangements other forms of valves and floats are used: in some cases two floats are employed—one connected to the valve, in order, when permitted so to do, to raise the valve, and another float to regulate the height to which the water shall rise in the water cistern or vessel before the valve is raised, such second float being arranged to release the valve-float. In some cases the cistern or vessel used for flushing is divided into two compartments, and mounted on an axis in such manner as to incline first in one direction and then in the other, the water being supplied first into one and then into the other compartment from a constant source of supply. Each of the compartments has an outlet at the bottom which is closed by a valve, and such valve is caused to open by the act of the water vessel or cistern inclining over to one side. By these means, there being a constant supply of water to a cistern or vessel, the water will be periodically allowed to flow out of the vessel, and cause the flushing action to take place from time to time.

The claim is for the mode of combining the mechanical parts as described.

1195.—Vincent Louis Vodoz, of the Westminster Club, Albemarle Street, London, for "*An improvement in the chimneys and glasses of gas and other lamps.*" Patent dated May 27, 1858.

This invention has for its object an improvement in the chimneys and glasses of gas and other lamps. For this purpose a disc of fine wire gauze—by preference iron wire—is raised at its edges so as to produce a ring or frame suitable to fit on the upper part of a chimney or glass of a lamp. By this application of wire gauze to the upper part of the chimney or glass of a lamp, the flame is greatly improved and the production of smoke prevented.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

2467.—Richard Archibald Brooman, of 166, Fleet Street, London, for "*Improvements in treating air and gases, and the employment of the same for obtaining motive power.*" A communication. Nov. 4, 1858.

2487.—Wilhelm Ziervogel, of Hettstädt, Prussia, for "*Improvements in apparatus for distilling products from bituminous coal, schist, peat, and other like substances.*" Nov. 6, 1858.

2491.—John Richmond, engineer and machinist, of 21, Carlisle Terrace, Fairfield Road, Bow, Middlesex, Joseph Quick, jun., and Alexander Fraser, civil engineers, both of Sumner Street, London, for "*Construction of a meter for measuring water, spirits, or any other fluids.*" Nov. 8, 1858.

2526.—Edward Locke, of Newport, Monmouth, engineer, for "*Improvements in the construction of gas-meters.*" Nov. 10, 1858.

2537.—Charles Tiot Judkins, of 32, York Road, Lambeth, London, for "*Improvements in gas regulators.*" Nov. 10, 1858.

2553.—Gustave Schmidt, of 2, Caroline Street, Bedford Square, London, for "*Improvements in the manufacture of cast-iron pipes.*" Nov. 10, 1858.

2604.—John Leslie, of Conduit Street, London, for "*Improvements in the manufacture of gas.*" Nov. 18, 1858.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

1584.—James Jones, of the City Water-Works, Oxford, engineer, for "*Improvements in meters for measuring liquids.*" July 14, 1858.

1635.—John Cartwright Hill, of Kentish Town, Middlesex, for "*Improvements in making joints for connecting pipes and other articles by means of lead or other soft metal.*" July 20, 1858.

2195.—Hypolite Monier, from Marseilles, France, and 2, Francis Street, Golden Square, London, for "*A new gas-burner.*" Oct. 2, 1858.

Parliamentary Intelligence.

NOTICES GIVEN FOR GAS, WATER, AND IMPROVEMENT BILLS.

Session 1859.

Gas Bills.

Borough of Marylebone Gas Company (Limited).—Incorporation of company, with power to supply gas to the borough of Marylebone and neighbourhood.

Bury St. Edmunds Gas.—Amendment of Act; consolidation of shares; increase of capital.

Cardiff Gas Consumers' Company.—Incorporation of company, with power to purchase lands, manufacture and supply gas, &c.

City of London Gaslight and Coke Company.—Repeal of existing Act; reincorporation of company; increase and regulation of capital.

Scarborough Gas.—Increase of capital; amendment of Act; and other purposes.

Tottenham and Edmonton Gaslight and Coke Company.—Incorporation of company and increase of capital; supply of gas to Tottenham, Edmonton, and Hornsey; power to break up streets, &c., and extend limits of present supply.

Wisbeach Gas.—Incorporation of company; purchase, maintenance, and erection of gas-works; supply of gas; contracts with public bodies, and powers of sale to corporation, or local board of health of the borough, or other persons.

Water Bills.

Arnold Water-Works.—Construction of works; powers of supply to Local Board of Health; contracts with Nottingham Water-Works Company.

Arnold Water-Works.—Incorporation of company; construction of works; supply of water to parishes of Arnold, Lambley, and Carlton.

Brighton District Water-Works.—Incorporation of company and construction of works; purchase of Cliftonville Water-Works; and other powers.

Brighton Water-Works.—Incorporation of company; construction of works; laying of pipes; and purchase of land, &c.

City of Norwich Water-Works.—Additional capital; further provisions for preventing waste; amendment of Acts.

Eastbourne Water-Works.—Incorporation of company; construction of works; supply of water to the town of Eastbourne and places adjacent thereto within the parishes of Eastbourne and Wellington; purchase of works, &c., of "The Eastbourne Water-Works Company (Limited);" power to raise capital, &c.

General Hydraulic-Power Company.—Power to acquire land, and provide and use works, and levy rates.

Lancaster Water-Works.—Sale or transfer of undertaking by the Local Board of Health to the Corporation of Lancaster; extension of limits of supply; power to adjacent townships to contract; new works; power to purchase additional lands and springs; rating powers; alteration of rates; powers to apply corporation funds and raise money on rates, or by sale of corporate property; amendment on repeal of Acts.

Liverpool Corporation Water-Works.—Amendment of Acts; alteration or repeal of certain provisions as to supply of water down the river Roddlesworth.

Maidstone Water-Works.—Incorporation of company; construction of Works for the supply of water to Maidstone and the neighbourhood.

Maidstone, Brompton, Rochester, Strood, Chatham, and Gillingham Water-Works.—Incorporation of company; making and maintaining water-works; repeal or amendment of local Acts; power to levy rates, &c.

Maidstone Spring Water-Works.—Incorporation of company; construction of works; purchase by consent of the water-works of the Commissioners of Pavements of the town and parish of Maidstone, in the county of Kent.

Nottingham Water-Works.—Extension of limits of supply; powers to Arnold Local Board of Health; amendment of Acts.

Penarth Water-Works.—Incorporation of company to supply water to vessels frequenting the Penarth harbour and docks, and for domestic and other purposes in parishes adjacent thereto; arrangement with Penarth Harbour, Dock, and Railway Company.

Shepton Mallet Water-Works.—Incorporation of company; construction of works and laying of pipes; purchase of land, &c., by compulsion or agreement, &c.

Sunderland and South Shields Water-Works.—Extension of works; additional capital; amendment of Act.

Wirral Water-Works.—Incorporation of company, and establishment of water-works for supplying the townships of Tranmere, Oxton, and other places in the county of Chester; purchase of lands; rates.

Improvement Bills.

Richmond Improvement.—Appointment of commissioners for general improvement of the town and parish; power to supply gas and water, and to purchase existing works; amendment of Acts, &c.

Salford Borough.—Power to raise further moneys; amendment of provisions of existing Acts respecting the gas-works and the moneys expended thereon, and the securities for the same; and for other purposes.

Stockport Improvement.—Power to corporation to preserve flow of water in rivers Mersey, Goit, and Tame; to apply money and levy rates for the purpose; new streets, bridge, and works; site for depositing rubbish; accounts, slaughter-houses, paving, and general improvement powers; application of gas profits; inspection of weirs and gauges for ascertaining supply of water from Manchester Corporation Water-Works; purchase of lands; rates; amendment of Acts.

Legal Intelligence.

COURT OF QUEEN'S BENCH.

Monday, Nov. 22.

(*Sittings in Banco, before Lord* Campbell *and Justices* Wightman, Erle, *and* Hill.)

THE QUEEN *v.* THE JUSTICES OF ESSEX.

In this case a rule had been granted calling upon certain justices of Essex in petty sessions, and also on Messrs. Inde, Coope, and Co., brewers at Romford, to show cause why the magistrates should not hear and determine an information laid by the Dagenham Local Board of Health against the Messrs. Inde and Co. for causing a nuisance in the parish of Dagenham. It appeared on the opening statement of counsel before the magistrates that Messrs. Inde and Co. carried on their business in the parish of Romford, and that the nuisance complained of consisted in pouring refuse from the brewery into the river Rom, which afterwards passing into the parish of Dagenham became a nuisance there. On this statement it was objected by Mr. T. Atkinson, for the defendants, that the magistrates had no jurisdiction to determine a complaint preferred by the Local Board of Health of Dagenham, in respect of a nuisance caused, as this was, out of the area of their jurisdiction—viz., in the parish of Romford. The magistrates allowed the objection, and declined to hear and adjudicate on the complaint. The present rule was then granted.

Mr. T. Atkinson now showed cause against the rule, and referred to the several sections of the Nuisances Removal Act (18th and 19th Victoria, cap. 121, secs. 3, 8, 10, 12, 18, and 30) to show that the local board had jurisdiction only within a limited area, and that the magistrates had rightly declined jurisdiction.

Mr. Woollett, in support of the rule, contended that the nuisance complained of was caused in Dagenham, and therefore the magistrates had jurisdiction.

Lord Campbell said that, although the parties complained of were liable to an action, or an indictment, they were not liable to be proceeded against

under this Act. Looking at the 30th section, his lordship thought it was quite clear that the Local Board of Health had no jurisdiction, unless both cause and effect were within what the Act called the "area of their jurisdiction." It was not the intention of the Legislature to give a summary power to two magistrates to determine as to the cause of a nuisance spreading over several parishes. The remedy for that still remained as it was at common law. The act causing the nuisance here was in the parish of Romford, by throwing refuse into the water there; but there was no act done within the area of the jurisdiction of the Dagenham Board of Health.

Mr. Justice ERLE was also of opinion that the rule ought to be discharged. The magistrates had only a limited area of jurisdiction, and over matters which they could decide upon by the eye, touch, or, at all events, by the smell—such as heaps of filth, cesspools, &c. Here it was objected that the nuisance complained of was caused out of the area of their jurisdiction—viz., at Romford. His lordship thought that no two justices had power to enter upon the inquiry whether the nuisance complained of in Dagenham was consequent upon the nuisance caused in Romford. An inquiry of that sort required the highest scientific knowledge, and was of a very complicated nature; and it would be most dangerous to sanction the notion that two justices could try so complicated a question as that of nuisance or no nuisance arising at a distance.

The COURT, therefore, discharged the rule, but without costs.

COURT OF BANKRUPTCY.

WEDNESDAY, NOV. 24.

(*Before Mr. Commissioner* GOULBURN.)

RE THE PLUMSTEAD, WOOLWICH, AND CHARLTON CONSUMERS' PURE WATER COMPANY (LIMITED).

In this case a petition was presented by six of the shareholders (holding between them 400 shares in the undertaking), praying for an order to wind up the affairs of the company.

Mr. LAWSON appeared for the petitioners, and Mr. BOWER for the directors.

The case of the petitioners was that in the year 1852 the company was established for the purpose of supplying the above-named districts, and such other towns and places as the majority of the shareholders should think fit, with pure water. The capital of the company by the Deed of Settlement was to be £25,000, divided into 5000 transferable shares of £5 each; and it was provided that in case the whole of the said 5000 shares should not be subscribed for or disposed of, the shareholders for the time being should continue associated and bound in like manner, as if the number of such shares had been the whole number agreed or intended to be issued. It was also provided that it should be competent for a majority of two-thirds of the shareholders, at an extraordinary general meeting, to create new shares to an amount not exceeding £25,000, the same majority having power also to vary the number of the original shares. They could also authorize the directors to borrow on mortgage of the real estate or chattels real of the company, or such other securities as to such meeting should seem fit, any sum not exceeding £10,000. The board were at liberty, by the terms of the deed, to appoint any one of their own body to be the managing director of the company, and also to fix, as they should see fit, the amount of his remuneration. The managing director was to act in the general superintendence of the affairs of the company, to keep in safe custody the common seal, and all deeds, securities, and other documents belonging to the company. The shares subscribed for were to be paid by an instalment of 10s. in the pound within a week of the signing of the Deed of Settlement, and the balance in such manner as the directors should determine. All new shares created and not accepted within two months, were to be treated as forfeited; and it was provided that the company should be dissolved upon the passing of a resolution at two meetings by the vote of a majority of two-thirds of the shareholders. The company was registered on the 14th of October, 1852, and commenced business operations on the 1st of September, 1854, in Ann Street. The petitioners allege that, of the 5000 shares originally issued, a large number were subscribed for, and that a considerable number were also given to one Lewis Davis, a director, as paid-up shares in the undertaking, in consideration of certain transactions between him and the other members of the board, and that thereby the company were involved in considerable expenditure and loss. In May, 1855, a resolution was come to, to increase the capital by £25,000 in the issue of new £5 shares, although at that time the whole of the original capital had not been subscribed. The petitioners express doubts whether the transactions with Mr. Davis are not impeachable, and also whether the increase of capital was authorized by the Deed of Settlement. In October, 1852, Mr. Davis was appointed by the board of directors to be chairman of the company, and he acted as the managing director down to August, 1857, and during that interval the land on which the company's works were constructed was purchased of Mr. Davis. Besides being chairman, managing director, and landlord, Mr. Davis was also treasurer of the company. It appears that no dividend has ever been paid to the shareholders, and that there is a loss on the working operations of the company from the 1st of September, 1854, to the 30th of June, 1856, of £3351. 7s. 6d., and for the following year of £1444. 18s. 5d. From October, 1854, the London and County Bank acted as treasurer to the company, and in that capacity there is due to them £9420, which sum is secured by a deposit, by way of equitable mortgage, of the deeds relating to the leasehold works, and also a number of acceptances, all overdue. Interest at a very high rate has been paid upon this debt; and in addition thereto, there are sundry debts due to general creditors amounting to £3750. The company have sustained losses to the extent of £7794, of which £1718. 16s. 4d. are upon shares issued by the directors at a discount of £2, fetching £3 instead of £5. The whole of the original and additional capital has been realized, with the exception of 1090 shares not subscribed for; the total sum subscribed was £44,550, exclusive of sums allowed by way of discount. No resolution has been come to to dissolve the company, but at a meeting of the shareholders it was resolved that in order to make the operations of the company profitable, works must be constructed from Ann Street to the reservoir in High Street, Woolwich, the probable cost of which would be about £7000. The directors urged the shareholders to take the undisposed-of shares to provide the means for carrying out these works; but out of the money so subscribed creditors were paid, and no steps were taken towards the execution of the necessary works. The powers of the directors to raise money upon the property of the company have been exercised, and are now exhausted. The assets of the company consist of leasehold land, reservoirs, wells, steam-engines, pumps, purifying and other machinery, and sundry buildings and other property forming the works at Plumstead; of main pipes, services, &c., laid through the districts supplied by the company; a stock of pipes; office furniture; cash in hand, &c., a little more than £3000, with some instalments overdue on shares. The income derived from the supply of water is little more than sufficient to keep down the current bills of tradesmen; and there is no prospect of any increase of the means of the company without an expenditure of some £7000 on the new works. The company yields no profit to the shareholders, and, with the exception of the few unallotted shares and the overdue instalments, there are no funds for the payment of the £9420 due to the bank, the £3750 to the general creditors, or the £7000 for constructing the proposed works. On the 5th of November, 1856, the company was registered as "limited" under the Joint-Stock Companies' Act, since which no considerable number of shares have been issued; and the debts were principally contracted prior to such registration. Since the beginning of 1856 the directors have frequently urged that, unless money was raised to meet the exigencies of the company, they would be compelled to resign their office, and they have employed the means placed at their disposal by the issue of shares at a discount of £2, to meet the pressing demands of particular creditors; so that there has been no substantial relief from the general embarrassed position of the company, and there is reason to believe that the bankers had threatened to sue, and it is known have refused to cash the cheques of the company. On the 26th of August, 1857, the accounts were referred to Messrs. Butler and Cannings to investigate and report thereon, and on the 22nd of January, 1858, a committee, consisting of four directors and five shareholders, was appointed to investigate the report, balance-sheet, and accounts so prepared. This committee made a report of the result of their inquiries and investigations on the 10th of June last, and that report was adopted at a general meeting of the proprietors held on the 24th of the same month. On the 20th of August, at an adjourned general meeting, the directors made known the critical position of the company's affairs, and said that they could no longer carry on the works if money was not raised; but no money has been raised for the purpose. At a meeting of the directors on the 21st of October it was resolved to take immediate steps for winding up the company; and on the 1st of November inst., at a meeting of the shareholders, it was resolved to put no faith in the schemes submitted for the resuscitation of the company, and that a petition to wind up should be presented to the court by an independent contributory, and not by the directors. The company are unable to pay their debts, their capital, exceeding £33,412. 10s., or above three-fourths, has, within the meaning of the Act, become unavailable, and a petition to wind up was presented to the Court of Chancery on the 5th of November, 1856, under the Joint-Stock Act of 1848 and 1849, and an order made thereon. The present petition seeks relief, so far as the operations of the company under "limited" registration are concerned.

Mr. LAWSON said he was not prepared to go into the case on this occasion, and he asked that the petition might stand over.

Mr. BOWER said he had no objection so far as his clients, the directors, were concerned.

The COMMISSIONER doubted whether he ought not at once to dismiss the petition. He did not say that in this case it was so, but in others, petitions had been presented—as in former times fiats in bankruptcy were taken out—for an improper purpose.

Mr. LAWSON thought there possibly might be some force in his honour's objection, had this been the petition of a creditor, but it was the petition of contributors, to the prayer of which the directors assented. A petition had also been presented in the Court of Chancery, and an order made for winding up the affairs of the company prior to their later and limited incorporation.

After some conversation as to the practice of the Court of Chancery in such cases,

The COMMISSIONER consented to the petition standing over until the 15th of December, and an order was made accordingly.

Miscellaneous News.

THE MANCHESTER GAS-METERS.

MEETING OF THE CITY COUNCIL.

At a Special Meeting of the Council held on Wednesday, the 1st instant—the MAYOR presiding—a report from the gas committee was presented, containing copies of correspondence with Mr. F. A. Taunton, the gas-meter inspector for the corporation of the City of London, relative to his experiments upon Crosley and Goldsmith's patent meter (No. 48,657), which he states will give an unjust registration to the amount of 18 per cent. He further alleges that, although this meter bears a badge of 1857, he can with confidence assert that it was manufactured specially for him between the 29th of June last and August 4.

Alderman SHUTTLEWORTH (the chairman of the gas committee) moved the adoption of the report, and entered at great length into the whole question of this dispute respecting the best meters, and justified his detention of the council on the ground that there were several new members who had not heard his previous arguments. It happened, too,—which he very much regretted, though he believed the newspapers exercised a judicious determination upon the subject,—that none of the newspapers had given anything like a full report of what took place in the council on the 27th of October. He was therefore under the painful necessity of requesting the indulgence of the council while he recapitulated briefly what he had perhaps more strongly stated before. Alderman Shuttleworth then stated the circumstances attending the communications between Mr. Crosley and the committee, most strongly condemning his conduct, as being in substance an attempt to obtain by intimidation and threats the adoption of his meter, as soon as he found that he was not likely to succeed upon any merit in his invention. The speaker gave the results of various experiments, made by gas engineers, in confirmation of his opinion and that of the committee, that Parkinson's meter, although not perfect, was more just to all, and especially more beneficial to the consumers, than that of Mr. Crosley. He particularly referred to an interview Mr. Crosley had with the committee, when he charged the servants of the gas establishment with tampering with the meters by overcharging them with water, and that the overcharging was not accidental. He then, in a letter, threatened the gas committee with an exposure unless they did something or other, which, from the tenor of the letter, evidently meant unless they would promote his interest. It was an insulting threat, that unless they bought his meters, without testing them or without trial, he would expose them to the public. Mr. Shuttleworth then referred to an alteration which Mr. Crosley had made in his advertisement (inserted regularly in the JOURNAL OF GAS LIGHTING for two or three years) since the last meeting of the council. On the 28th of October, as before, the advertisement contained the words, "by which the true water-line is constantly maintained, and accuracy of measurement at all times secured." He (Mr. Shuttleworth) then made his exposure of the action of this meter to the council, and, in the following number of the same journal, the words were changed to the effect that the meter "cannot be under or overcharged with water, and they constantly register the quantity of gas consumed with greater accuracy than any meter in which the water-line is variable." Mr. Crosley's remarks respecting the alleged inferiority of material in Messrs. Parkinson's meter were next commented upon. There were 26,000 of these meters in use in Manchester, and the cost of last year's repairs amounted only to £257. 12s. 6d. The reports

of various gas engineers upon this meter were then quoted. Mr. Cleminshaw stated that the meter constantly started slow, but by the effect of the revolution of its own wheel, it pushes the water higher and higher, so as to make what was a slow registration into a fast one, the latter being against the consumer. Mr. Hawksley said that eleven experiments showed that the meter registered 15 per cent. against the consumer. Mr. Evans reported that it was accurate only when measuring from 13 to 15 feet per hour; from that point it increased until it registered 16 per cent. against the consumer. Mr. Shuttleworth then spoke in defence of Parkinson's meter, and, adverting to a statement made on a former occasion by Mr. Rumney, that he had seen one of Parkinson's meters which registered 60 per cent. wrong, said that opportunity ought to be given to test that meter, being persuaded that there must be an error either in the calculation or the method of testing. After giving much statistical detail respecting the experiments with meters, and reading the report of Mr. Taunton, in conclusion, Alderman Shuttleworth said that he had been now for more than thirty years connected with the gas committee—(hear, hear)—and for nearly twenty years he had been its chairman. During that time the establishment had progressed in all respects—as to the amount of profit, the quality of the gas, and the economy of management—to an extent that had no previous parallel here or elsewhere. He believed that they were now on the eve of supplying to the public a perfectly pure gas—(hear, hear)—a thing which, hitherto a desiratum, had nevertheless been considered by scientific men almost hopeless of accomplishment. The profit under his management had been much larger than ever it was before. He mentioned these things that gentlemen might perhaps make some allowance for his trespassing upon their patience with so very many details, unfitted as he was to do so with effect, from physical incapacity, and because he did indeed feel deeply interested in the success of the works.

Alderman NICHOLLS seconded the motion.

Councillor RUMNEY (a newly-elected member of the gas committee) said: I shall, Mr. Mayor, trespass as little as possible, but, in justice to myself, I cannot in brief time reply to the statements which Alderman Shuttleworth has, on two successive occasions, laid before the council. (Cries of "Adjourn.") I choose to proceed; and I do hope, as the matter is so important, the council will bear with me. They will remember that on two preceding occasions we have had much of the same representation made to the council, and, in fact, no opportunity whatever has yet offered of—(Mr. Shuttleworth made some interrupting remark, but was called to order)—doing what I said I should be able to do—proving to the council that I, at any rate, did not draw my facts from my fancies, or, as one gentleman suggests, my facts from my imagination, but that I have made assertions which I can substantiate, and I hope I shall do so. One preliminary observation I would just make. If the worthy alderman would take from a young man a word of counsel, it would be to try to be less abusive. (Hear, hear.) I am sure it must have struck other members that either Mr. Shuttleworth is in league with Mr. Crosley—a partner, or otherwise, in his business—or else he is an exceedingly bad diplomatist; for most assuredly has Mr. Shuttleworth secured my being placed upon a committee on which I did not want to act, and so assuredly the abuse which, if reported to-day, must bring—as it inevitably does in all cases, whether men are right or not, if they only get sufficiently well abused, the public sympathize with them—and it must bring an amount of custom to Mr. Crosley of which he has very little expectation, I am sure, at the present moment. (Hear.) I have not a word to say about my motives. I do not suspect other people, and therefore do not feel it necessary to vindicate my own motives. (Hear, hear.) I have been charged with manifesting an interest against the prosperity and credit of the gas department. Now, that is a charge which Alderman Shuttleworth has again and again brought against me. (Mr. Shuttleworth again interrupted, and was again called to order.) What I have really alleged is simply this:—I say you have a monopoly of the manufacture and supply of gas in Manchester; that you have a particular measuring instrument, and you prohibit the consumers using any other measure—this is generally true, the exceptions but establish the truth of it; and that that measure is not an accurate one practically, that while it may be accurate under certain circumstances, it is not accurate under other circumstances, and that generally, instead of registering the correct quantity supplied to the consumer, it registers a very much larger quantity than is actually consumed. That is the question. I have said nothing about the management of the gas committee or its chairman, who has presided over it for twenty years; I have made no charges, Mr. Mayor. I ask the council to testify whether I have brought any charges against the management, or if I have charged the officers of the gas committee or Mr. Cleminshaw with disreputable conduct. (Applause.) I have simply confined myself to what I have just alluded to, and which I hope I shall be able now to substantiate. Bear in mind I have stated the possible variation of the meters used to be 60 per cent. I have said this, and I repeat it, that it may be clearly before the council. I trust the council will bear with me in passing through a mass of figures. I have stated distinctly that Parkinson's meter will register 60 per cent. against the consumer. The evidence which I have to tender has been already referred to. (Alderman SIMPSON: Is it one in Manchester?) Yes, and in use at the present moment. I turn to the report of the committee as presented at the last meeting, and I find that even the committee admit that this inaccurate registration may take place, though without giving the extent of it. They say—"It appears to your committee that the chief, and, indeed, it may be said the only objection, which exists to the ordinary meter of Messrs. Parkinson and Co., is that the pipe which conveys the gas from the inlet valve to the measuring compartment is placed higher than the water-line, and that the meter may, consequently, be overcharged with water, and be thereby made to indicate more than the real consumption." Mr. Cleminshaw also, in his report in Appendix A, states that "the meters made by Parkinson's and all other firms are essentially the same, and register correctly, provided one condition be secured—namely, that they contain only the proper quantity of water." Mr. Hawksley says in his report—"With respect to the meters supplied to large works under my own management, I have latterly directed that the spouts of the meters shall be guaranteed to extend not more than a quarter of an inch above the water-line, &c." I wonder why there was any necessity to do this. You have heard it admitted fully this morning that the meter will register inaccurately by Mr. Alderman Shuttleworth. Now, Alderman Shuttleworth, on the last occasion but one, referred to some self-adjusting mechanism, by which this inaccuracy was preserved within very narrow limits. Some of the members may remember that I took occasion then to state that no such self-adjusting mechanism, which he described as the result of scientific inquiry, existed. On the last occasion, Mr. Shuttleworth again referred to this mechanism, and then passed off to that stale joke of Captain Cuttle's watch. Now, I do not believe that Alderman Shuttleworth will make a statement knowingly untrue, and therefore, when I assert again that there is no such mechanism in Parkinson's meter, I can only infer that Alderman Shuttleworth is not familiarly acquainted with the construction of the meter, and, if he will condescend, I shall be most happy to explain it fully to him—(laughter)—and show him that there is no such self-adjusting mechanism or any other—because he cannot allude to the float, for that is not peculiar to Parkinson's, but belongs to all wet meters. I say positively that it has no existence except in the fancy of Alderman Shuttleworth, and if he is not convinced of that, I shall be glad to open a meter before his eyes, and to satisfy him upon that point. I find also a confirmation of this inaccuracy in the fact that the committee will allow the meters to be cut down. Now, why have they made this concession? (Hear.) Surely nothing has been said in this council to induce the committee, so satisfied of its justice, to pander thus; there is no public opinion excited upon the subject—it has not attained that—and yet they will allow every high-spouted meter to be cut down into a low-spouted meter. I say these are evidences, at any rate, that Parkinson's meter is an incorrect register of gas, as admitted in the evidence of Mr. Cleminshaw himself, Mr. Hawksley, and in the report of the gas committee presented at the last meeting. Now I come to the more positive evidence which I have to lay before you. As Alderman Shuttleworth has again referred to former statements and reports presented, I may be excused for following his example. When this matter first came before the council, I read a report from Mr. Barlow in reference to four meters which Mr. Crosley had extracted the water from, as to whether it was possible in Mr. Barlow's opinion that these four meters would register the amount of gas against the consumer which Mr. Crosley had reported that they would do. The report of Mr. Crosley is to this effect:—

Letter of Reference to Experiment.				
A	1	10-light	which was overfilled with water to such an extent above run-off plug as to cause it to register	1 per cent. more gas than consumed.
B	1	2-light	ditto	1·2/10ths do.
C	1	3-light	ditto	1·2/10ths do.
D	1	10-light	ditto	1·2/10ths do.
E	1	5-light	ditto	1·9/10ths do.
F	1	3-light	ditto	2·3/10ths do.
G	1	10-light	ditto	2·5/10ths do.
H	1	30-light	ditto	2·7/10ths do.
I	1	3-light	ditto	3·3/10ths do.
J	1	3-light	ditto	3·3/10ths do.
K	1	5-light	ditto	3·6/10ths do.
L	1	5-light	ditto	3·7/10ths do.
M	1	3-light	ditto	4·1/10th do.
N	1	5-light	ditto	4·5/10ths do.
O	1	3-light	ditto	5·2/10ths do.
P	1	10-light	ditto	5·9/10ths do.
Q	1	3-light	ditto	6·3/10ths do.
R	1	5-light	ditto	8·6/10ths do.
S	1	3-light	ditto	11·3/10ths do.
T	1	10-light	ditto	11·4/10ths do.
U	1	3-light	ditto	12·9/10ths do.
V	1	5-light	ditto	15·1/10th do.
W	1	3-light	ditto	27·7/10ths do.
X	1	3-light	ditto	35 do.
Overcharged above run-off plug	—			
	24			
	2	3-light	Not filled above the level of run-off plug.	
	4	5-light		
	3	10-light		
	2	20-light		
	1	30-light		
Total number examined.	—			
	36			

That was the report which Mr. Crosley presented to the committee. Mr. Barlow was asked to examine those meters, and to see whether they would allow gas to pass through without registration so much against the consumer as this. He says:—

Manchester, August 23, 1858.

I have examined the four wet gas-meters indicated under the letters T, V, W, and X, in the report addressed to the gas committee of the council of the city of Manchester by Mr. William Crosley, on January 15, 1858, and I hereby certify that, without intercepting the passage of the gas through them, the three meters marked T, V, and X may be overfilled with water to a greater extent than they were found to have been actually filled when examined by Mr. Crosley, and that the effect of filling them with water up to the point they will bear without affecting the light, will be to cause them to register against the consumer to a greater extent than stated by Mr. Crosley in his report. The meter W is apparently a lower spouted one than some others used in Manchester, as it will not bear overfilling so as to register much more than about 27¼ per cent. in excess of the quantity actually consumed.

I have also gone carefully through a series of experiments upon meters of 3, 5, and 10 lights of the make and construction used in Manchester, with the view of testing the accuracy of Mr. Crosley's report as to the effect produced upon the registering index by overfilling such meters, and I am quite satisfied that in these respects his statements are perfectly correct, and that these meters, when overfilled in the manner described by him, will register against the consumer in the proportions given in his report.

THOMAS G. BARLOW,
Civil and Consulting Gas Engineer,
42, Parliament Street, London.

I have to bring Mr. Barlow into this question, and I want to show his competency as a witness by the evidence of Alderman Shuttleworth himself. In the report which Mr. Barlow saw in the *Manchester Courier*, he thought Alderman Shuttleworth had made some remarks which he was not justified in doing; and I am sure—(Alderman SHUTTLEWORTH: Read it, sir.) Allow me to proceed without opposition, or I shall be longer. I am sure members of the council generally will have noticed that the reports in the *Courier* are very fair indeed. (Hear.) One has not seen the slightest bias, and generally they are certainly the best reports of the proceedings of the council. (Applause.)

Alderman SHUTTLEWORTH made some remarks, but his voice was drowned by calls of "Order."

Councillor RUMNEY appealed to the mayor for protection against these interruptions, and the mayor interfered.

Alderman SHUTTLEWORTH: I merely want to bear my testimony to the accuracy of the reports in the *Courier*.

Councillor RUMNEY; You shall bear your testimony in a moment. I will put you into the witness-box, if you will allow me. I will read the whole of the letter addressed by Mr. Barlow to Alderman Shuttleworth; for though Mr. Shuttleworth read a portion of it, I had, perhaps, better read it again:—

(Copy.)

42, *Parliament Street* (*S.W.*), *London, Nov.* 1, 1858.

Sir,—Presuming that I am the person alluded to in the report of your speech at the meeting of the Manchester City Council (held on the 27th ult.), inserted in the *Manchester Courier* of Saturday last, as "Barlow, a gas engineer in London, who stated that he had examined four of Crosley's (Parkinson's) meters, and that he was satisfied that Mr. Crosley's statements were correct," I beg to hand you annexed a copy of the only certificate I have given on this subject, and I invite you to correct your assertions in conformity thereto in such manner as you may see fit.

At the same time I beg to say I am ready to attend in Manchester at any time you may appoint (with reasonable notice) in order to test the accuracy of my report. So far, however, from approving of the course taken by Mr. Crosley to force his meters upon the gas committee in opposition to their wishes, I have uniformly deprecated it, from a conviction that it would fail in its object; and my interference in the dispute is limited to an examination, the result of which is to show that abuses *may* be practised by the use of high-spouted meters. I carefully avoided committing myself in any way to a confirmation of Mr. Crosley's assertions as to the extent to which these abuses prevailed in Manchester, and I therefore refrained from stating the fact that from one of the meters I examined on Aug. 23 last, and which I was informed had not been touched since it had been watered a few days previously by the inspector of the gas committee, I drew off by the side plug 10½ cubic inches of water after the gas had been shut off at the main cock. Every particular of this case is at your service should you deem it necessary to inquire into it.

I am, Sir, your obedient servant,

Mr. Alderman Shuttleworth, Manchester. (Signed) THOMAS G. BARLOW.

Mr. Shuttleworth's letter in reply was as follows. I mention this that you may be sure that Mr. Barlow, in the estimation of Mr. Shuttleworth, is a very competent witness on this subject. And bear in mind that Mr. Barlow is one of those men who attested the examinations he has read from, I think, the JOURNAL OF GAS LIGHTING:—

(Copy.)

Bowdon, near Manchester, Nov. 3, 1858.

Sir,—I have to acknowledge the receipt of your letter of the 1st inst., very justly remarking on the manner in which I am reported in the *Manchester Courier* to have referred to you. I assure you I am deeply mortified to find myself so grossly misrepresented. In mentioning you, I spoke of you and your professional position in the terms of respect which your well-known reputation entitles you to claim in any public notice of you, certainly in language which was the very opposite of offensive. The report in the *Courier* is very inaccurate, and I much regret that it should favour or suggest the notion that I had made a discourteous mention of you. I disclaim having done so. Assuring you of this with every sincerity,

I remain respectfully, your obedient servant,

T. G. Barlow, Esq., London. (Signed) J. SHUTTLEWORTH.

As I shall have to call Mr. Barlow into the witness-box again, I want to have Mr. Shuttleworth's testimony to the competency of the witness. Now, sir, determined not to be satisfied with one examination, I have spent some time, and been at some trouble and expense. I went to London for the purpose of testing one of Parkinson's meters, and from what Mr. Shuttleworth had said of Mr. Barlow, I went to him. I knew no other gas engineer, or anybody likely by name, and I had never seen Mr. Barlow before. I took Mr. Barlow with me for the purpose of putting to the test one of Parkinson's meters. I give you now the result. It was a 3-light meter, with the date of 1857. We tested first——

Alderman SIMPSON: Have you the number of it?

Councillor RUMNEY: Yes, I have the number of it.

Alderman SIMPSON: Will you have any objection to give it? (Cries of "Go on")

Councillor RUMNEY: It does not affect the experiment. We tested first the standard meter by air with 4-10ths of an inch pressure, and found it to be correct. The testing gasholder had been tested before by Mr. Barlow himself. We tested this standard meter again, by which Parkinson's meter and another were afterwards tested. We found it correct. We then tested Parkinson's meter at the water-level, by passing 5 feet of air. These experiments were done with air, for the air of the room being of equal temperature with the water in the meter, the experiments were considered more accurate than the gas. But we did them both ways. By passing 5 feet of gas the standard meter registered 5 feet, Parkinson's 4·97 feet, or 0·6 per cent. slow. Let me state here that 4 per cent. of variation is admitted by all authorities and meter-makers, and that within 2 per cent. of the line on either side a meter is considered commercially accurate; and all those remarks that have reference to inaccuracy, unless they go beyond that 2 per cent. either way, are beside the question altogether. We then put in 70 cubic inches of water without flooding the syphon. I should have been glad if I had had time to explain more clearly, but I must take it for granted that you are perfectly familiar with the meter. Parkinson's registered 5·00 feet, the standard registered only 3·20 feet, making Parkinson's 1·80 feet fast, or 56·25 per cent. on the quantity consumed—that is, against the consumer. We did not flood the syphon by it. We put 70 cubic inches of water in; the gas passed or registered at the rate of 56·25 per cent against the consumer. We then added 3 inches more water. Parkinson's registered 5 feet, and the standard 3·11 feet, or 60·77 per cent. fast, or against the consumer. We then reduced the water-line (experiment 4) to the true water level, and then, by increasing the pressure of the gas, we forced out 35 inches of water by the side plug, and tried it at the same pressure, but found that with this quantity of water abstracted it would not work. You will bear in mind the inference has been that it would register as much in favour of the consumer if below the water-line, as it would against the consumer if above the water-line. Let me call your attention for a moment to what Mr. Cleminshaw himself has said, and I ask the council—I will not say it is unfair—but I ask if it is fair, when he gives the particular amount at which it will register in favour of the consumer, 5 or 6, but he says nothing of the extent to which it will register against the consumer when above the water line? (Hear.) No, they could not find that out either one side or the other—Cleminshaw or the engineers, on the other hand, who have reported for him—they could not find out how far it would go on the other side. (Hear.) Well, it would not work with 35 inches of water taken out. We then added 10 inches of water, thus reducing the quantity of water taken out to 25 cubic inches. Parkinson's meter then registered 5·0 feet, the standard meter 5·255 feet, or 5·1 per cent. slow, which is the utmost extent to which that meter will register in favour of the consumer below the water-line. The sixth experiment was to this effect:—We filled the meter to the water-line, and then added 25 inches of water above, to show the difference between 25 cubic inches above the water-line and 25 below; and what is the result? Parkinson's meter registered 5·0 feet, the standard meter 4·44 feet, or 12·61 per cent. fast, or against the consumer. Now, there is the difference between 25 inches of water taken out below the water-line, and 25 added. In one case it gives 5·1, in the other 12·61, or rather more than one-half. The seventh experiment:—We filled up 60 inches of water above the regulated water-line, and Parkinson's meter registered 10 feet, the standard 6·78 feet, or 3·22 feet fast, or 47·49 against the consumer. These experiments did not depend upon the amount of time. I challenge Mr. Cleminshaw to prove, that if it is inaccurate for an hour, under the same circumstances, it is inaccurate for any other length of time. Therefore all he has said about going on for hours and weeks is all to no purpose. After meters have once started, the registration may be measured off in the time in which these reports declare with perfect accuracy. Having finished these experiments, we re-tested the standard meter to see there had been no variation in that, and we found it was still perfectly correct. Now, gentlemen, I have never examined my own meter—I have never watered it. I confess to an amount of ignorance which many of the gentlemen in the council have themselves acknowledged. But, sir, this morning, for the first time in my life, I went down to my own meter, and what did I find? I drew off the water to the true water-line, and filled it up by the addition of 86 7-10ths cubic inches of water It is a 3-light meter. I ask Mr. Cleminshaw or the committee to examine that meter. It is not a simple rule-of-three sum, because the higher up you fill it the more it registers against the consumer. But suppose you reduce it to a rule-of-three sum:—If 73 inches of water register against the consumer 60·77 per cent., what will 86 7-10ths register against the consumer?

Councillor HAWORTH: Did it burn?

Councillor RUMNEY: Yes, of course. All the conditions in the explicit instructions sent out by the committee were attended to—taking out the plugs and putting them in again, precisely following the instructions. With 82 inches above the water-line, the lights burned steadily. I think I have said enough to satisfy the council that I have made no unguarded statements when I say that the meter of Parkinson's is an inaccurate register up to the extent of 60 per cent. (Hear.) How far beyond that has yet to be determined. I come now, sir, to Mr. Crosley's meter, and I am very glad that I shall not take up quite so much time as I expected. I need not say that my object has not been to induce the committee to take Crosley's or anybody's meter; all I have contended for is, let us have an accurate meter. (Hear.) We ought to have a meter which shall stand any reasonable test, such as all meters are subject to. Surely it is possible to have scales that shall weigh accurately, though of different construction; and, if we can find one more accurate than another, let the consumers of gas have that meter. (Hear.) But, sir, I am obliged to say more than I should have done because of the most unfounded charges which have been made about Mr. Crosley and myself. I can simply give my opinion that I believe there is not a statement which Mr. Crosley has made before the parliamentary committee which will not, on a fair construction, vindicate him as a moral man I do not know whether Mr. Shuttleworth is aware of the constitution of that committee, but a number of the members were put on especially and avowedly to protect the interests of the gas companies in London, and another part was put on by the parochial authorities of London. No wonder, if when a man has been subject to two days' examination, he is not always quite up to the mark in his answers. I have looked through that evidence,—I trust without bias,—and made inquiries, and I am satisfied that there is nothing, however injudicious Mr. Crosley may have been,—and he has been injudicious, I admit,—I believe that there is not a single fact connected with him that at all affects him as a man of irreproachable moral character. This is proved by the way he acted with and for the largest firms in this kingdom—Stephenson, McKenzie, Brassey, and others, with whom he had millions of pounds passing through his hands, and from them he has the highest testimonials that man can have as to his intelligence and his moral worth. (Hear, hear.) Though he may have been, and I admit he has been, indiscreet, I believe that all the charges made against him are perfectly groundless if thoroughly investigated.

Alderman SIMPSON: No.

Councillor RUMNEY: Well, now, what are the evidences that you have had before you? It is a curious fact that every man of them is connected with high spouted meters. (Hear.) I do not know how many more applications were made, but what am I to infer when told by Alderman Shuttleworth that the opinions of men that did not coincide with the opinion of Mr. Cleminshaw were set at nought? That is a strange way of obtaining unbiassed testimony. How many of those, I wonder, have been destroyed? If the opinion of a man, not because he is eminent, is brought before us, but because it harmonizes with Mr. Cleminshaw's, it is worthless. I should like to know how many applications were made to other engineers. Surely these are not all the gas engineers in the world; and those opinions which did not harmonize with the opinions of Mr. Cleminshaw have been consigned to "the tomb of all the Capulets." But, sir, it is a curious fact that at the time Mr. Hawksley, who is the engineer of the Nottingham Gas Company, was giving his testimony, or about the time, an investigation was taking place in Nottingham itself similar to that which I tell Mr. Alderman Shuttleworth will take place in Manchester, and of 37 of these high-spouted meters, 34 were found to be overfilled with water. (Hear.) Then you have the evidence of Mr. Wright. I suppose one is not generally in the habit of asking a competitor to test our own articles, and report upon them. (Hear.) Mr Wright is himself a meter-maker, not an entirely unbiassed or unprejudiced party. I dare say it would be very difficult for any of us to give an opinion against ourselves. Mr. Wright says "that he cannot say that in his experience he has found, to any extent, that consumers have been so defrauded; but I think the evil, if possible, should be avoided. I have, therefore," says this manufacturer, "used such meters only as it was impossible to overfill." We shall see what Mr. Wright has done. In conjunction with Mr Barlow, I have examined one of Mr. Wright's low-spouted meters that "cannot register against the consumer." The result is this:—It was a 2-light meter, No. 5282, manufactured in 1854. At the adjusted water-level, when Wright's meter registered 2 feet, the standard meter registered 1·96 feet, or 2·04 per cent. fast. That is not so very bad; it is almost within the commercial limits of accuracy. Put in 24½ inches of water above the water-line, and Wright's meter registers 2 feet, while the standard meter registered only 1·65 feet, or 0·35 feet too much, being 21·21 per cent. fast; or, deducting the 2·04 per cent. which it was fast at the adjusted water-line, it registered 19·17 per cent. fast, or against the consumer! Then, again, the discrepancies which you find in this evidence make it, in my opinion, not worth very much, if they do not render it altogether worthless. Mr. Evans says a 3-light meter is correct when passing from 13 to 15 feet per hour, which is the proper quantity; but Mr. Cleminshaw does not find it correct; he finds it 4 per cent. against the consumer at that rate. Now, in a very able Parisian publication ("*Le Gaz*"), there is a report—a translation of which I have here—in which these discrepancies are brought out pretty distinctly in an article upon the discussion which has taken place on this subject in the Manchester City Council. They say here that Mr. Cleminshaw found that with a consumption of 7½ cubic feet of gas the error amounted to 1·8 per cent. fast. This is in reference to Crosley's meter. Mr. Hawksley found it to be 1·0 per cent. fast, Mr. Cleminshaw 3·55 per cent fast at 15 feet per hour, while Mr. Evans pronounces it to be accurate! and so on—so that these witnesses are not very harmonious among themselves. We generally find they disagree, and some of them are apparently copied from one another. If you find them disagreeing so much, you ought to have doubts about the value of their testimony. The writer of the article in "*Le Gaz*" says that these results were to him so surprising that he instituted a series of experiments himself, and arrived at this conclusion:—"Evidently," says he, "Crosley's meter is quite accurate. Why, then, do our neighbours insist upon the contrary? We have given the answer in our last number, and the fact seems to us to be proved." And then, in conclusion, they say: "To return to Crosley's meter, the description of it which we published last July was sufficient to refute the allegations against its mechanism and the amount of pressure requisite to put it in motion. Whatever may be said

upon the subject, the agents of the public authorities of Paris are well able to appreciate the correctness of its workings; and it was only after long and severe examination that it was allowed to be stamped by them." That is the testimony from the independent and unbiassed authorities of Paris in reference to Crosley's meter. Now, then, we have Mr. Taunton's report. I shall follow Mr. Taunton rather closely. I may state that Alderman Shuttleworth has given his very high opinion of Mr. Taunton. Mr. Taunton, curiously enough, was one of the agitators in Liverpool to get the high-spouted meters cut down. (Hear, hear.) Mr. Taunton states, in reference to this meter of Mr. Crosley's, which he examined—"I can state with confidence that this particular meter was manufactured in the interval (between the period when the order was given and the meter supplied), although it bears a badge of 1857." Well, that is a very serious charge. Now, sir, without telling Mr. Crosley what I was about, or the object I had in view, I called for his stock-book, and I called his men before me to ascertain the truth of it, and I declare, upon the best evidence it is possible to obtain, and which would be taken in any court, that it is an absolute untruth. (Hear.) The meter was finished and taken into stock in February, 1857, and had not been touched since. I saw the stock-book, and it was entered at the time stated. There were other meters put down in consecutive numbers and sent out at the time. From the questions I put to the men I am prepared to say, and am justified in saying, that the statement of Mr. Taunton in reference to this meter being manufactured for him for this special purpose is totally inaccurate. (Hear, hear.) I have more to say about this meter. I instructed Mr. Crosley to send to Mr. Taunton for it. That meter was returned; it was sealed up by me and Mr. Barlow, not in Mr. Crosley's presence, for he was gone, and I have the result of an examination by Mr. Barlow. Testimony no higher, it is admitted, can be had upon that meter, which Mr. Taunton declares registers 18 per cent., without giving any particulars, against the consumer. I have this from Mr. Barlow:—

(Copy.)

42, Parliament Street (S.W.), London, Nov. 27, 1858.

Sir,—I beg to hand you annexed the details of the experiments I have made on the registration of Crosley and Co.'s meter, 48,657 (Crosley and Goldsmith's Patent, No. 1943), which I received on the 24th inst. from the hands of a messenger sent by Mr. F. A. Taunton, and which meter I at once sealed up in such a manner as to render it impossible to open or otherwise tamper with it; and, as the seals still remain upon it unbroken, it may be further tested by any other person.

The meter is constructed to pass 25 cubic feet of gas per hour, but it will really pass about 70 feet per hour without the steadiness of the lights being affected to any considerable extent. Its registration at the various rates of delivery at which I tested it, is as follows:—

At	6·02 feet per hour. . .	0·01 per cent. fast.
	29·56 " " . . .	0·90 "
	51·58 " " . . .	1·06 "
	70·58 " " . . .	1·86 "

It cannot be made to alter the above rates of registration either by overfilling or by underfilling, and it is within the limits of the tolerated variation from absolute truth of 2 per cent., even when driven at nearly three times its proper speed.

I am, Sir, your obedient servant,

(Signed) THOMAS G. BARLOW,

Robert Rumney, Esq.,
Burgess Terrace, Hyde Road, Manchester.

Experiments made upon a 5-Light Crosley and Goldsmith's Patent Meter, bearing date 1857. *Makers' Number*, 48,657—*Patentees' Number*, 1943.

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Rate of Consumption in Feet per Hour.	Variation per Cent. in Index of Patent Meter.
	h. m. s.				
1	1 39 27	9·99	10·00	6·02	0·01 fast
5	0 40 13	19·82	20·00	29·56	0·90
10	0 23 1	19·79	20·00	51·58	1·06
14 unsteadily	0 25 2	29·45	30·00	70·58	1·86

(Signed) THOMAS G. BARLOW,
42, Parliament Street, London, Nov. 27, 1858.

It will be seen that the variation is within the commercial limit of 2 per cent. Not satisfied with that, sir, the meter has been sent down to Liverpool, under seal, and I have before me the certificate of an examination by the corporation meter-inspector of Liverpool, and by the meter-prover of the Liverpool Gas Company. (Hear, hear.)

(Copy.)

Gas-Meter Inspector's Office,
Public Offices, No. 2, Cornwallis Street, Liverpool,
Nov. 30, 1858.

Size.	Makers' No.	Patent No.	Date.	Consumption by Meter.	Consumption by Gasholder.	Difference.	Meter per Cent. Fast.	Meter per Cent. Slow.	Rate of Consumption in Feet p. Hour.	Equal to No. of Burners at 5 Feet.	Equal to No. of Burners at 3 Feet.	Pressure on Gasholder.
				feet.	feet.							
5	48,657	1943	1857	10	10	—	0	0	20·33	4·06	6·77	5/10
5	48,657	1943	1857	10	10·10	·10	0	1	37·5	7·5	12·5	—

I hereby certify that the above is the result of testing a gas-meter submitted to me by Mr. Crosley on this date. (Signed)

(*Corporation Stamp.*) DANIEL HORTON, Official Inspector.

(Copy.)

Meter-Testing Department of the Liverpool United Gaslight Company, Nov. 29, 1858.

Mr. Crosley,—We hereby certify that we have tested your 5-light meter, No. 48,657—1857—and the following are the results obtained:—

When passing gas at the rate of 44 feet per hour, the meter was 0·3 per cent. slow; when passing 50 feet per hour, was 1·3 per cent. fast; and when passing 18 feet per hour, it was perfectly correct.

THOMAS EDWARDS.
EDWARD KEENE, Meter Tester.

This meter was tested with my permission.

Liverpool, Nov. 30, 1858. ALFRED KING.

I have only to say that I think this is enough to invalidate the testimony of Mr. Taunton. The meter is in Manchester, and it shall be submitted to the inspection of Mr. Cleminshaw or anybody else—(applause)—with the absolute certainty that the meter is a commercial meter, made at the time it was declared by Mr. Crosley to be made, and not made for the purpose of being tested by Mr. Taunton. With this conviction of the accuracy of Mr. Crosley in this respect, I ask Mr. Cleminshaw and the gas committee to have that meter fairly tested, and to see whether these reports of Mr. Taunton are to be looked upon as of any value in public estimation. (Hear.) I have just to refer again to the report of Messrs. Lowe and others, upon which reflections have been cast by Alderman Shuttleworth, the report on Crosley and Goldsmith's patent meter by these gentlemen. Now, Mr. Shuttleworth did not tell you, at the time he read and commented upon these names, that Mr. Barlow's name was also attached to the report.

Alderman SHUTTLEWORTH: Oh yes, I read his letter.

Councillor RUMNEY: Let me just state that Mr. George Lowe, Civil Engineer, Fellow of the Royal Society, &c., is one of the oldest and most experienced gas engineers in the world—(hear)—a man whose opinion is quoted in all journals and in all works upon gas lighting. He is consulting engineer to the European and several other gas companies, and has been for forty years engineer-in-chief of the oldest gas company in England. Mr. John Kirkham, late engineer-in-chief to the Imperial Gas Company, was twenty-three years engineer of that company, which is the largest gas company in the world, and a man of unquestioned authority upon gas matters. Mr. Geddie Pearse, late engineer-in-chief to the Incorporated and British Gaslight Companies, was twenty-five years engineer to to the British, and had charge of the works at Hull, Norwich, Trowbridge, and other places. He is now an independent gentleman, and has no official connexion with any gas company, but he has an interest as a shareholder in several gas companies of London, and his opinion is not to be invalidated by anything Alderman Shuttleworth can say. Of Mr. Barlow I need say no more. Now for their experiments, which Mr. Shuttleworth only referred to to laugh at them. [The speaker here read the report of Messrs. Lowe and others on Crosley and Goldsmith's meters, a copy of which will be found in the columns allotted to advertisements, and then continued:—] I think this is testimony quite as valuable as any that you have had submitted to you by the engineers on the other side. Now I shall not take up the time of the council much more. I wanted to confine myself as much as I possibly could to facts. I think I have succeeded in inspiring the council with some doubts, at any rate, as to the value of the present meter. (Hear.) Then comes the question—Are they practially overfilled? Well, I appeal to gentlemen present if that has not been admitted over and over again, that the great ignorance on the part of the public—even if the council is to be taken as the exponent of that ignorance—does lead to their overfilling. What is the actual fact, as stated here—that if the lights begin to burn unsteadily, that every one does not go or send down to the gas-meter office, but goes and puts in water, and, as he finds that by putting in water the lights begin to burn steady, he is satisfied. It occurs again, and he pours in more water. He has never been instructed till now that there was a plug at the side, which determined the true water-line. (Hear, hear.) I am told that the gas committee have not been instigated by Mr. Crosley to make any alteration,—they are too independent for that,—and that these instructions which are now issued to consumers have been in the hands of the committee for many months past. (Hear.) Why, then, were they not issued before? Was the committee itself ignorant of this practical overfilling with water or not? If it was ignorance, then I think, with the abundant assurance of knowledge that we have had, it was an unpardonable ignorance. If it was not ignorance, then I say you were allowing an inaccurate register; you knew it to be inaccurate, and you were allowing it, for the benefit, I admit, of the town in another way, and for increasing the profits of the gas committee, but at the expense of the gas consumer. (Applause.) But, sir, I have now a more specific statement to make. Very fortunately for my purpose, very much to my surprise, our gas-meter was inspected yesterday. I take this on the evidence of my wife. I suppose it will be admitted. (A laugh.) She says they were unusually long in that inspection. Well, I do not know whether they put any water in or not, but I do know this, that I drew off from that meter this morning, in presence of a witness, 26 cubic inches of water above the water-line! (Hear.) This was done in accordance with the instructions which have been sent out to us. (Hear, hear.) This, on the calculation which I have made, is a registration of 13 per cent. against me as a consumer. (Hear, hear.) I have seen, sir, with my own eyes in London 30 to 40 high-spouted meters in pieces, and there was no mistaking where the water-line had been. I challenge you to let us see the insides of the meters in Manchester. The line of oxidization which indicates the water-line in those 30 or 40 meters was from half an inch to an inch and a half above the true water-line. (Applause.) Will you show us in the same way the interior of the high-spouted meters in Manchester? I have no hesitation whatever in declaring that you will find them the same here as I have found them in London. Well, now, what is the real fault of this meter of Crosley's? Simply that, when driven beyond its proper speed, it does not register quite accurately. But is it fair to try a balance with a pound that was made to weigh an ounce? That is really the fact; and because it strains the beam, and does not weigh the pound, therefore it is inaccurate! It was not intended to weigh the pound; and no meter ought to be made to do what meters are said to be doing in Manchester; for it will come to this:—The instructions which you have sent out will lead to the evil which Mr. Shuttleworth deprecates. They will lead to the going out of the lights. Why? Because, if you increase the revolutions of the drum, you can only do it by increasing the pressure; and if by this means you increase the speed of the meter, you increase the evaporation of the water. Now, at present with the overfilling you can put on any pressure, you can have a large quantity of water, you register fearfully against the consumer, but the lights do not go out. Reduce your water-line to its true level, you would have accurate measurement. Burn from 8 to 15 lights through a 3-light meter—as is said to be done—and what happens? By increasing the revolutions of the drum you rapidly increase the evaporation, and will have constantly to be filling up the water to its true level, or else you will have just the effects which Mr. Shuttleworth deprecates. I admit it will be so; and it will become a question whether you will supply from 8 to 15 lights through a 3-light meter, and pay an additional 5, 10, 15, 20, or 50 per cent. on your gas-rent, or whether you will have a 5-light meter, paying some additional cost at first, and save your gas-rents to that extent. That is really, Mr. Chairman and gentlemen, the question which has to be solved. I have now done what I intended to do: I have confined myself as much as possible to facts. The matter will not rest here. (Hear, hear.) I was never so much astonished at anything as this morning. If I had had time I should have gone to my neighbours. I shall do it in the morning. The evil is of such great magnitude to the consumers that, whatever becomes of profits from gas-rents, at any rate this council will have, out of deference to public opinion, to supply a meter—whether it be Crosley's or somebody else's—which shall accurately measure the quantity of gas supplied to the consumer. (Loud applause.)

Councillor HAWORTH (a member of the gas committee) said: I should not have risen on this occasion, but I feel myself disgraced by the conduct

of Mr. Cleminshaw in reference to these reports. I have been absent some twelve weeks on the continent, and therefore knew nothing of what was doing; but on my return I find this report. I analyze it, and I find such a variation in the statements of the parties that really I was astonished that it should be admitted by the council. One states one quantity, another another. They all differ. The chairman alluded to Mr. Crosley in a manner that grieved me. I believe Mr. Crosley is a highly respectable man, and his whole conduct has been what any spirited honest man's conduct would be. For, mark you, the chairman relates a number of circumstances of Mr. Crosley's conduct in making these statements; but he is something like the ex-Premier—when he sent forth his address to his constituents, he put as a reason for going to war with China, the conduct of the Chinese after hostilities had been commenced. (Laughter.) So has the chairman. They insult Mr. Crosley, and nearly kick him out of the office—("No" and "Yes")—and then come the circumstances——

Alderman NICHOLLS: I must protest against such an assertion as that, for I was present.

Councillor HAWORTH: I did not say that he was kicked out of the office, but he was used very ill.

Alderman NICHOLLS: More respect could not have been paid by the committee than was paid to Mr. Crosley.

Councillor HAWORTH: Allow me to state, Mr. Mayor, when Mr. Crosley brought his meter before the committee, previously serving the committee with notice that certain statements were to be made of importance, there was a full meeting of the committee that day. His statements were made, and he gave his reasons for going to examine these meters. His reasons were these:—After we had given Mr. Crosley on a former occasion an order for meters, Mr. Cleminshaw said: "Mr. Crosley, though your meters are ordered, I shall continue to recommend Parkinson's." (No.) You may put what construction you like on that, but that is what Mr. Crosley says; and I have not found his veracity impeached in any shape or form. I cannot say so of the other side. More than that, he said—"Mr. Bardsley states in a conversation that the general tendency on the part of the inspectors will be to overfill the meters." Well, now, I felt that we were much indebted to Mr. Crosley for bringing these facts of our selling by short measure before us, and not making the matter public. Mr. M'Dougall proposed a vote of thanks to Mr. Crosley for having so done. I, in the committee, seconded it; but the chairman, with his usual warmth, says, "Ho! a vote of thanks to a man that will come and disturb our meters!" (Laughter.)

Alderman SHUTTLEWORTH rose to explain.

Councillor HAWORTH continued: Mr. Cleminshaw was appealed to to know if he could ascertain these facts relative to the meters? "No, he did not see that he could." He was as knowing as a child on the subject. Sir, allow me to tell you the time was so far spent that we had formed a sub-committee to investigate the matter, and were breaking up, when the chairman said, "Stop, gentlemen, stop, I have a report on Mr. Crosley's meter," which the chairman will now say was a "memorandum," but you must put your own construction upon that. (Laughter.) "I have a report on Mr. Crosley's meter to read to you." We said we would have it read at our next meeting. ("From whom?") Why, from Mr. Cleminshaw. It was handed up by the chairman as a report, folded up, a number of sheets of foolscap, in the usual form of a report. Well, I went home with this matter on my mind, that Mr. Crosley had taken a liberty if he had removed these meters. At dinner it occurred to me that I would know the bottom of this. I returned to the Town Hall, and asked Mr. Cleminshaw if he could tell how Mr. Crosley had dealt with these meters. Oh no; he didn't know anything about it. Mark you, I said, "Mr. Cleminshaw, would you allow me to see that report, or read it to me?" This report was read to me. Now I put it to you, Mr. Mayor and gentlemen, could I be deceived in its being a "memorandum?" Mark what follows. He reads the report to me, wherein he states the only two points for the committee to consider in that report were the increased pressure to work the additional machinery and the increased cost; therefore, with those two exceptions, he approved of the meter. (Hear, hear.) Very well, I go away with the impression that this is Mr. Cleminshaw's opinion. I think any gentleman would have done the same. I go to London the following day. A day or two after, when posting a letter at the General Post-Office, a gentleman taps me on the shoulder, and this was Mr. Crosley. He said, "I think you are a member of the Manchester gas committee?" I replied, "I am." He said, "I should like to have a few minutes' conversation with you." I said, "I think you are Mr. Crosley." "Yes." "I should like to have a little conversation with you too. (Laughter.) I want to know how it was that you should go and examine these meters?" He said, "If you will come with me to my works, I will show you." I went, and spent three hours there, and very much pleased I was; for this reason—because I found meters were made there on a good model, and with proper machinery—a large establishment, and well conducted—no question about it. And what did I see there? A testing apparatus which sank our testing apparatus in the office into the shade. Well, sir, I came away impressed that there was something in this meter, and Mr. Cleminshaw approves of it. I went down to Liverpool, and returned to Manchester; but before doing so I thought, as our chairman had spoken in such high terms of Mr. King on a former occasion, as being an eminent gas engineer and a highly respectable man, I could not do better than ask him his opinion. I said, "Mr. King, I have taken the liberty of calling upon you to know your opinion as to the best meter now before the market, as we in Manchester are about to change our meters." "Oh!" he said, "Messrs. Crosley's patent meter is the best." "Well," I said, "they are very expensive." "Yes," he said, "they are more expensive, and will require a little more pressure to work." "And what is that presssure?" "Half a tenth." "Mr. King," I said, "I am very much pleased to hear you express yourself so much in favour of this meter, for it corresponds with the opinion of our Mr. Cleminshaw." I did not know then that Mr. Cleminshaw had changed his mind. (Laughter.) Well, sir, I came back, thinking I had got information worth the committee's notice. No: the majority of the committee are then dead against Mr. Crosley. Mr. Crosley told me he had been before the sub-committee, and that both Cleminshaw and Bardsley had denied these statements, that the committee asked him to make an apology. As an honourable man, he declined; as a man of spirit, he would not make an apology, for he did not consider any necessary. Well, when I made this statement, and gave my experience before the committee, Mr. Simpson—Mr. *Alderman* Simpson—(laughter)—said, "Well, they can burn the gas from the bottom plug of Mr. Crosley's meter."

Alderman SIMPSON: No, that is a mistake on your part. I was not the person that said it.

Councillor HAWORTH: Well, but somebody else did then. (Laughter.) It was said. A day or two after I went to the gas office, and said to Mr. Cleminshaw, "It was stated at the last committee meeting that the gas could be taken from the lower plug. Mark what follows: Mr. Cleminshaw says, "Oh yes, it can be done." And it was done, and done clearly, as I thought. I went to Mr. M'Dougall; I thought he should see it, as he had taken an interest in meters. He went with me, but they could not make it act then. (Laughter.) They had to carry this meter from the front office into the back shop, and bring it back again; and this was done two or three times. (Laughter.) I said, "Mr. Cleminshaw, what is all this doctoring going on in the back shop?" (Laughter.) I said, "Let me see it work in the back shop." (Laughter.) Mr. M'Dougall saw this with me, and he will bear me out. We saw it in the back shop. What does Mr. Cleminshaw then admit? that though the gas burns from the bottom plug, it is gas that is registered. (Loud applause.) I said, "Mr. Cleminshaw, why have you tampered with our time in this way?"—for I had spent an hour with him—"why did you not tell me this before?" "Well," he said, "Mr. Bardsley said it did so." Well now, really, what can you give for the evidence of such men? (Hear.) I have no confidence in any report coming from our manager with such prevarication. Then in the gas committee I am asked to make an apology to Mr. Cleminshaw; why, it is ridiculous! (Laughter and "hear.") Now, mark: I felt grieved really at the conduct of Mr. Cleminshaw, as I will show. I asked Mr. M'Dougall—I am sorry to detain you, gentlemen—("go on")—as I have devoted many hours to these gas matters, I asked Mr. Cleminshaw to show Mr. M'Dougall the report that he read to me. It could not be found then! "He thought the chairman had got it." So we were satisfied we could not have it. I find since it turns out to be a "memorandum." Why I say I have no confidence in a man who will act in this prevaricating way. It is ridiculous to waste gentlemen's time with such nonsense. I will tell you where I am more particularly hurt than in any other way. Mr. Rumney has positively called our attention to a publication that has analyzed this report. Is not that the fact? What has Cleminshaw done, without any resolution on the books to authorize him to do it? He has got a wheelbarrowful of these reports printed—(hear)—he has sent them to every large consumer in the city—(hear)—he has sent them all over the kingdom beyond the city—he has sent them to the continent, for I know one that was addressed to a prefect of police. I say that, as a gas committee we are disgraced by such conduct, for they are sent out in a spirit of persecution against Mr. Crosley. (Applause.) He was charged in the first onset with having moved meters, and he never moved them at all. Why, the simple mode of testing the meter was to draw out the water and measure it by a 10-inch graduated glass measure. If 60 or 70 inches were drawn off, then so much space was occupied by water that should have been occupied with gas. The meter being circular at the top, the higher the water rises, the more the robbery. (Laughter.) I really feel sorry, Mr. Chairman, to get up here to make a charge that would operate against Mr. Cleminshaw, but I do it from a sense of duty—(hear)—and I feel satisfied that, from all I saw of Mr. Crosley, again and again he is a gentleman. ("No" and "Hear.") He spoke respectfully, and no question about it. But if the managers order meter manufacturers to make to such a height in the spout, they are obliged to do it. There is something in that. In Parkinson's meter you must have some range, or otherwise the gas will always be getting up. There is another point to show that Mr. Rumney is right in his statement touching the matter of the meters being overfilled. Look at the inspector's books. You will now find a record made where they draw the water down and where they fill up; they make a record of the filling and the drawing off. But look at the book two months ago, and you will find no such entry. (Hear, hear.) This is where Mr. Crosley has served the public. (Applause.) The gas committee are indebted to Mr. Crosley for calling our attention to the fact that we were selling by a deceitful and false balance—(hear)—that we were receiving money for gas that the people had not had. (Hear.) I say the public are indebted to Mr. Crosley, and I think the committee are much indebted to Mr. Crosley, for having brought the subject before the gas committee, and not made it public in the first instance, for it would not have been made public if we had met him in a fair spirit. But it was not so. This is a fact, as you will find by perusing the documents. I do not say that the meters have been wilfully overfilled, but from a slovenly mode of doing the business—hasty—fill up and go! (Laughter and applause.)

Councillor GRUNDY justified his conduct on a previous occasion, and expressed his satisfaction that gas consumers were likely to have justice. Alderman Shuttleworth had accused him of advocating Mr. Crosley's meter; but the fact was, he had not recommended any meter in his speech, and only privately to the gas chairman. Yet he was accused of being the advertising medium of a meter manufacturer. Mr. Crosley's might be a better or worse meter than the present; he had not the scientific knowledge necessary to determine that; but he wanted the question raised, and he was gratified that good was likely to arise. (Hear, hear.) His original statement was, that the gas committee worked in an old groove, which the chairman was very unwilling to be driven out of, that the trade in meters was almost a monopoly, and that the meter in use was very defective. That position he believed he was perfectly correct in maintaining. The gas committee had improved of late, for which he was grateful. They now allowed consumers to have their meters cut down to low spouts, but at their own cost; it would have been more handsome if the committee had undertaken this. In addition, they had issued instructions to gas consumers how to manage their meters. There never was such a stretch of condescension on the part of the committee before—the gas committee positively enabling them to check their own invoices. The chairman's speeches were, however, totally at variance with the committee's acts. Mr. Grundy alluded to his statement that he had seen meters registering 60 per cent. falsely, and he repeated that he referred to what he had seen, without knowing whether the experiments were scientifically correct. The report studiously avoided stating how far the meters registered falsely. (Alderman SIMPSON: No.) Well, he did not press it, as it was, no doubt, a sore point. He had a strong conviction that the consumers of gas had been paying a great deal more than they ought. He repeated that good would result, and for this he was quite content to pay the price of a little abuse from Alderman Shuttleworth. Several members rose to move the adjournment of the council.

Councillor BENNETT: I really think the gas committee are at present put upon their trial.

Councillor COTTRELL: I rise to order, Mr. Mayor.

Alderman SIMPSON (deputy-chairman of the gas committee) claimed a hearing, which was conceded. He deprecated the large amount of personality introduced into the discussion. ("Don't you follow it.") He deeply regretted to find that there was a determination on the part of some parties to assign motives to the gas committee, and to make charges upon them, which existed only in the groundless fabrications of their own brain. Mr. Grundy said the gas committee had never inquired into the question of overfilling.

Councillor GRUNDY: I did not; I said they had never reported upon it.

Alderman SIMPSON: But he went further, and said they had studiously avoided it. Mr. Simpson gave the results of experiments made by order, which were, that a 2-light meter was capable of being overfilled 7 per cent., and a

3-light meter 6 per cent., a 5-light meter 8 per cent., and a 10-light meter 4 per cent.

Councillor GRUNDY: Is that published in the report?

Alderman SIMPSON: An analysis by Mr. Bardsley gave the higher per centage of from 17 to 28, consequent on higher pressure. The reason this had not been published was on account of the time wasted by this discussion, which took up the time of their servants, and threatened to seriously interfere with the gas profits. He believed Mr. Crosley to have acted a part in reference to these transactions which was thoroughly unjustifiable, which degraded him as a gentleman—(no)—and which cast upon his moral character the gravest and the most serious imputations. No gentleman would charge a disinterested public body of men with wantonly and flagitiously endeavouring to rob and cheat the public. Mr. Crosley's object was to sell his meter—(hear)—that was the ultimatum at all hazards. As regarded the graver imputations upon his moral character, Mr. Crosley had made statements in his letter which were totally false. After much more personal matter, Alderman Simpson referred to the attack on Mr. Cleminshaw, which he thought to the last degree objectionable and wrong. They knew the kind of accuser who attacked a man behind his back. If Mr. Rumney and Mr. Dyson had suggestions to make, they should bring them forward in the gas committee, and not in the council, where the discussion could have no purpose but puffing the miserable machine which Mr. Crosley had presented to the public.

Alderman CLARK expressed the great pain which Mr. Haworth's attack on Mr. Cleminshaw gave him. It was very easy to make attacks. For instance, since he had been in that room he had heard a whisper that a member of the gas committee, recently on a visit to London, stopped at Mr. Crosley's house. Now, it would be very easy for him to select a member of the committee, and say, "You are the man;" but he had not sufficient data, or else he would certainly make that very statement.

Alderman BANCROFT said that the grave charges made against parties evidently required consideration and some steps on the part of the council. He was very much surprised to hear Mr. Rumney say that the parliamentary committee was packed.

Councillor RUMNEY explained that he had only said there were members put on the committee avowedly to protect certain interests.

Alderman SIMPSON: You used the word "packed." (No.)

Alderman BANCROFT continued: The gas committee did not deny that Parkinson's meter could be abused, but nobody supposed the abuse was intentional. He wondered Mr. Grundy and others on the gas committee did not propose to have the meters tested.

Councillor GRUNDY: Not being on the gas committee, I have not the opportunity.

Alderman BANCROFT: But Mr. Rumney was on that committee. Why was this dispute not brought to a conclusion in the only legitimate and practicable way? As to the serious statement made by Councillor Haworth about Mr. Cleminshaw, the matter could not rest there. He would suggest this: get Mr. Crosley's, Parkinson's, and four or five other meters in use in the office, and invite the most competent parties in the country to test them; he was sure it would answer the purpose of the council to pay a few pounds expenses in bringing the most competent men in the country; and that there might be no hole and corner investigation, bring the parties face to face, and have the meters tested in a way that would prove satisfactory to the community, then they would have done with all this bickering in the council. (Applause.)

Alderman SHUTTLEWORTH made another long speech in reply, and reiterated many of the charges and statements he had made before. He supposed that Mr. Rumney was the guest of Mr. Crosley while inspecting his meter.

Councillor RUMNEY: I never was in Mr. Crosley's house; I don't know where he lives.

Alderman SHUTTLEWORTH: He had referred to Mr. Rumney to give him an opportunity of denying the charge referred to by Alderman Clark.

Alderman CLARK: I never insinuated that he was the man.

Councillor HAWORTH: Nor I either. (Laughter.)

Alderman SHUTTLEWORTH was very glad that there was no disposition whatever on the part of these gentlemen to be considered as the intimate social friends of Mr. Crosley There was now the opportunity of bringing this matter to the proof, and proved it would be. (Hear, hear.) It was an opportunity which they had sought, and which Mr. Crosley had refused to afford them, and which Mr. Grundy and Mr. Rumney had hitherto refused. (Hear.) In allusion to his own speech in introducing the report—of which the *Courier* newspaper contained a full report, or nearly so—he hoped members would read that speech; and he should be obliged to the bitterest enemies he had, if they could point out one single syllable which either evinced a personal feeling on his part, or could possibly, to a just-minded man, excite offence in another. When he sat down, Mr. Rumney got up and at once pledged himself to the character of Mr. Crosley—(Councillor RUMNEY: No, no)—as incapable of a misrepresentation—(Alderman SIMPSON: Yes, you did)—and at the same time, strangely enough, announced that he knew very little about him. Mr. Crosley had maligned, calumniated, and slandered, not only the servants of the gas committee, but the gas committee itself by implication, and this without any provocation whatever, and Mr. Rumney had the imprudence to defend him. He was obliged to Mr. Rumney for his advice. He was quite conscious that occasionally—and, under present circumstances, he was afraid always—he did speak with a force and an intemperance that—— (Alderman Shuttleworth was overcome by emotion, and could not proceed for a time.) Mr. Rumney's advice reminded him of an anecdote. A soldier killed a savage dog that attacked him. The owner remonstrated, and said the soldier could have protected himself with the butt end of his musket. "Aye," said the soldier, "and so I would if the dog had run at me backward, and attempted to bite me with its tail." (Laughter.) Alderman Shuttleworth applied the story to Mr. Crosley, Mr. Grundy, and others. The misstatement of Mr. Haworth could only be surpassed by the scandalous misstatements of Mr. Crosley. Mr. Haworth had put slang expressions into his mouth which he never uttered. Mr. Haworth had taken less interest in this question than any other member of the gas committee. (Councillor Haworth appealed to Mr. M'Dougall, who stated that he had given his attention assiduously for weeks and weeks.) He was exceedingly glad that this matter was to be brought to the test. (Hear, hear.)

The report was adopted, and the council adjourned, having sat nearly five hours.

[The late hour at which the report of the concluding portion of this discussion has reached us compels us to use the condensed report given in the *Manchester Courier* in our first issue, but the full report will be given in a later edition.]

CROSLEY AND GOLDSMITH'S COMPENSATING GAS-METER.

Our intelligent contemporary, "*Le Gaz*," replies with effect to the querulous and obviously prejudiced reports of the persons employed by the Manchester Gas Committee to decry an ingenious attempt to remove the objections which have been very justly raised against wet gas-meters. The unprecedented means taken by a powerful municipal body to crush an individual, by extensively circulating such reports, not only throughout this country, but abroad, have produced a reaction in his favour, and have called forth spontaneous and disinterested manifestations of opinion as to the merits of the invention from persons who disapprove of some of the means taken by the inventor to promote its general use. Foremost amongst these is the writer of the article in "*Le Gaz*," which merits to be reproduced *in extenso* :—

(*Translated from* "*Le Gaz*" *of Nov.* 20, 1858.)

In our last number we published, under the title of "A Discussion," an article which brought under the notice of our readers the debates which have taken place at Manchester on the subject of the accuracy of Messrs. Crosley and Goldsmith's compensating gas-meter. Since then, we have made some very minute experiments on that instrument; but before making known their results, we think that we ought to publish a succinct analysis of the reports presented to the gas committee of the Manchester corporation, in order to fully acquaint the reader with the subject; in this manner he will be able to understand properly the real state of the question.

The committee nominated by the above corporation to report to them upon the different meters now in use, and with the object of assuring consumers that no fraudulent advantage was intended by their employment, presented its report to the council at the meeting on the 1st of September last.

We shall not in the following remarks dwell upon those parts of the report which are irrelevant to Crosley's meter.

Without stopping to consider what they call the extraordinary conduct of the inventor, and of which we have already spoken in the above-mentioned article, the committee expressed itself as follows :—

"The great superiority of this meter over any other meter now in use, has been asserted by Mr. Crosley with great assurance; and he has spread abroad many reports in order to lead the corporation, and the generality of the consumers, into the error that your committee could not depend upon the experience and knowledge of its own engineer, notwithstanding the great confidence he had in his own judgment, but had thought it their duty to ask for the opinions of some special engineers of known capacity and probity.

"In consequence, we submit to you a report by Mr. Cleminshaw upon the meters of Messrs. S. Clegg, Cowan, Brothers, Saundars and Donovan, and Crosley and Goldsmith, which report is accompanied by letters received from Messrs. Hawksley; A. Wright, manufacturer of meters; F. J. Evans, engineer to the Chartered Gas Company; Robert Jones, chief engineer of the Commercial Gas Company; and lastly, of Mr. Parkinson, manufacturer of meters: all these letters having reference to the working of Crosley's meter."

Before going further, we ask, was it wise to receive the opinions of manufacturers of meters? their interest being evident, because their instruments were attacked by the innovator. The names of Messrs. Hawksley, Evans, and R. Jones are, however, sufficient guarantees for the disinterestedness of their reports.

The committee add that, whilst these experiments were being carried on, they thought it right to allow the use of Crosley's meter; but that, after the reception of the letters of the above-named engineers (the conclusions arrived at by Mr. Cleminshaw being found correct), it was unanimously resolved that this instrument should cease to be employed, the interests of the consumers not being sufficiently protected by it.

We now propose to examine the report and letters, in order to appreciate the true value of this decision. But let us remark, previously to commencing the analysis, that the committee found fault with the apparatus of Mr. Parkinson, the make of which did not appear to be of the usual description, but permitted a surcharge of water in the meter, and consequently also allowed the registry of more gas than had in reality been consumed.

The first report, which accompanies the above preliminary remarks, is that of Mr. Cleminshaw. This engineer commences with the following important confession :—"You have agreed that the measurement of gas, with regard both to the producer and consumer, does not admit of an invariable and absolute exactitude." Although this admission may not justify the attempts made to arrive at perfection, it would nevertheless afford an argument against the conclusions of the report, as we shall presently see.

According to Mr. Cleminshaw, a good meter should possess three principal qualities :—

1. Accuracy in its indications;
2. Regularity in its movements, so as to produce a steady light;
3. Cheapness and simplicity of construction.

We are entirely of Mr. Cleminshaw's opinion as to the requisite qualities of a meter; but we cannot refrain from remarking that he must have very little confidence in any meter whatever, if he prefer, as he plainly says he does, the sale of gas by contract to that by measure.

His observations upon Parkinson's (successor to the late Samuel Crosley) meter—an instrument that has nothing different from that made and used by all the world, with the sole exception that it is manufactured with more care than usual—prove that it has a variation, in certain cases, of 5 to 6 per cent. in favour of the consumer, and of only 1 to 2 per cent. in favour of the company: this is caused by the valve and the syphon. Yet this is the instrument which the reporter takes as the type for his comparisons.

The first new meter that he examined was also the invention of Mr. Parkinson, who hoped, by lessening the height of the syphon in the first compartment, to render all excess of water impossible; but, as this instrument is a recent invention, the reporter, before passing an opinion upon its merits, desires to wait until practical experiments should permit him to form an accurate opinion. Truly, the wish is absurd when we think of the object of the committee! but we will proceed.

The second is the same new meter, by Mr. Samuel Clegg, which we lately described. In this case, Mr. Cleminshaw declares that he has not had opportunities of examining and testing this instrument, and has been limited to the account of its good qualities as given by the inventor himself. We pass on to the next.

The third meter, that by Mr. Cowan, he has described in a few words; but, as a like combination had failed some time ago, he will wait till its accuracy, as applied by Mr. Cowan, is ascertained by experience before he gives his opinion.

The fourth meter is that of Messrs. Saundars and Donovan. In this instrument the water is maintained at constantly the same level by means of a float, which acts as the water diminishes by evaporation; but, as this arrangement appears to Mr. Cleminshaw very delicate, and susceptible of disarrangement, it does not comply with his third requirement of a good gas-meter. His opinion with respect to this meter was influenced by these considerations, and he passes by the instrument without making any experiments.

Hitherto it may be observed that the Manchester corporation have not had, in the report, any information to assist them in arriving at their decision. But now comes the enemy, namely, Crosley's meter; and every possible means are employed to injure this invention, which in reality has only one pretension, viz., to register with perfect accuracy the quantity of gas consumed. Naturally, the reporter commences by a description of the instrument, its appearance and action; then comes the skirmishing.

"Immediately I received Crosley's meters, I examined with care their action, and the manner in which the level of the water is maintained constant, and I saw reason to doubt the accuracy of the principle."

Informed of this prejudice, Mr. Crosley demands an experiment, which the reporter says confirmed his previous opinion. Then the opposing parties undertake further experiments, and batteries of figures are brought to bear upon the subject.

For instance, a meter (the size of which we are not informed of, but which we think must have been a 3-light meter, if we may judge from collateral indications), was submitted to the action of 20¼ cubic feet of gas per hour (about 5 lights), and the experiment ended by showing a gain in favour of the company of 6 per cent.

A second experiment, namely, passing 28·0 cubic feet in an hour (about 6¾ lights), also showed a gain in favour of the company of 5·99 per cent.

Again, 29¼ cubic feet (7 lights) showed an increased loss of 6·18 per cent. against the consumer.

Again, 1½·2 cubic feet per hour (3½ lights), the loss was reduced to 3·55 per cent.

Again, 7½ cubic feet per hour (1⅞ lights) passed through, reduced the difference to 1·8 per cent.

The last experiment gave as the result of passing 3½ cubic feet per hour through (⅞ of a light), a loss against the company 1·28 per cent.

It is worthy of particular remark that these results were obtained by a comparison with those indicated by the ordinary meter of Parkinson. Who is to say that the latter would not give contrary results, of which the balance would greatly diminish the figures so boldly put forward? and this doubt which we now throw out is grounded upon the following sentences of the report:—

"I have made many other experiments, and I have always found that Messrs. Crosley and Goldsmith's meter acted inaccurately whenever the quantity of gas passing through it increased above a certain limit; under the same circumstances Messrs. Parkinson's measures either exactly, or too fast, IN FAVOUR OF THE CONSUMER."

Is not our doubt justified?

In spite of everything, Mr. Cleminshaw nevertheless reports against the apparatus of Mr. Crosley, as possessing none of the three essential qualities of a good gas-meter.

We will examine this question further in analyzing the other *reports*.

Mr. Thomas Hawksley commences the subject with a description of the Crosley meter, and cannot deny that the instrument possesses ingenious combinations, but at the same time he adds that it is expensive in price and complicated in its mechanism.

We perfectly agree with him, but we assert that numerous simplifications are practicable; at the same time, we have never been of opinion that Crosley's meter, as it is now constructed, presents any serious obstacles to its practical working.

Mr. Hawksley made some experiments, and shows, firstly, that when Crosley and Parkinson's meters were put in operation together, slowly, their indications agreed; then that, with a consumption of 10 cubic feet per hour (2½ lights), Crosley's had gained 1 per cent.

When the consumption was increased to 30 cubic feet per hour (7 lights), the meter gained 3½ per cent.

The level being restored, and 1 light only being used, Crosley's meter will be retarded to 1·7 per cent.; 2 lights being used, the accuracy would be complete.

But with a consumption of more than 31·7 cubic feet per hour, 8 lights being used, the gain has been 3·4 per cent.; and it has attained the figure of 7·1 per cent. with an expenditure of nearly 60 cubic feet per hour, this representing more than 14 lights.

The consumption being reduced to 12 cubic feet per hour (about 3 lights), the meter was retarded to 1½ per cent.; the consumption being increased again to 72 cubic feet (17 lights), it advanced to 8·35 per cent.; lastly, on introducing an excess of water into the meter, the reporter obtained an advance of 13·75 per cent. !!!

Observe that the meter experimented upon was one of only 3 lights!!!

Let us now see what is alleged by Mr. Wright, the meter manufacturer.

On hearing that Crosley's instrument was accused of inaccuracy, it caused him great surprise; but subsequent experiments have convinced him of the truth of the accusation, and on observing carefully the complications of the instrument, he found that the remedy applied by Messrs. Crosley and Goldsmith to the supposed imperfections of the ordinary meter, was worse than the evil.

Yet he thinks that it is possible, either from want of care or from fraud, so to overcharge Parkinson's meter as to render its indications too high, to the prejudice of the consumer; whilst, by allowing the water to evaporate, the indications might be altered to the prejudice of the company: however, the mean of the possible error will be in favour of the consumer. This observation is not without importance.

Mr. Wright then experimented upon a Crosley meter (the same one that had been used by Mr. Hawksley), and found that, at the ordinary rate of going, the meter was retarded 1·75 per cent.; then, a moment after, a gain of 3·15 per cent. took place; and with an expenditure of 25·6 cubic feet (6 lights), a gain of 7·25 per cent.

"I am not in the habit," says he, finally, "of criticizing the inventions of those in the same profession as myself; but I think I may be excused if I break through this rule with regard to Mr. Crosley, who has so boldly assumed to teach gas engineers what a cubic foot is, and to assure consumers a perfect measurement, whilst the real effect of his meter is only apparently to remedy the defects of the usual mode of measurement, but practically to place the consumer under the disadvantages above stated.

"I afterwards saw Mr. Evans, engineer to the Chartered Gas Company, who informed me that the meter sent to him by Mr. Crosley ALLOWED THE GAS TO PASS THROUGH WITHOUT REGISTRATION ON THE DIAL, simply by abstracting the water. I have this meter in my possession, and I shall be happy to show you this experiment if you have the time to call upon me."

Truly, we are very curious to see this famous experiment, for we believe that it is nothing but an unfounded assertion, for the report of Mr. Evans does not contain a word of this allegation. Take care, Mr. Wright! you are, from your profession, the antagonist of Mr. Crosley, and there is a French proverb which we may apply to your case—

"*Vous êtes orfèvre*," &c.*

Mr. F. J. Evans states, in his turn, in his report, that Crosley's meter is accurate when it is used to measure from 13 to 15 cubic feet per hour, but above that, it is inaccurate, and that when used to measure from 50 to 60 cubic feet, it gains 15 per cent. It is true, he says, that this quantity exceeds the ordinary cousumption for meters of 3 lights, but when the consumption is 21 cubic feet (5 lights), the advance is 2½ per cent., and if it rise to 35 cubic feet (a little more than 8 lights), it is 3·1 per cent.

According to Mr. Evans, Crosley's meter possesses at first sight the advantages claimed for it by its inventor, and the ordinary means of verification are ineffectual to discover the irregularity of its working; so that no inspector charged with the verification of the meters could detect the irregularity by those means. The cause is to be found, according to him, in the means employed to maintain the level of the water. It may be objected, he says, that meters are intended only to measure a certain quantity of gas per hour, but nine-tenths of the consumers do not observe this rule, and from this inattention there results a loss to the company of about 2 per cent. Finally, Mr. Evans asserts that Crosley's meter requires an increase of pressure to put it in motion.

Mr. R. Jones's report contains nothing new, except the assertion that Crosley's meter will be found to indicate incorrectly in this way; that at the beginning it will be found to be slower than Parkinson's, and that afterwards it is faster than the last-named meter.

Let us conclude with the allegations of Mr. Parkinson, the maker of the meter that was used throughout as a standard, although it certainly was not always praised.

His letter has for its object the refutation of the imputations relative to its irregularity, and it terminates with recriminations which, in our opinion, ought not to have found a place at the end of a business report; but apparently, against an enemy, every weapon is fair.

These, then, are the accusations made against Crosley's meter. After, however, reading and re-reading these reports, and carefully comparing them one with another, we can only discover that the author of each of them breaks a lance with the common enemy, whilst, frankly, we do not perceive the least trace of a wound. Decidedly it is a tournament, and not a battle. In fact, if we examine to what extent the various authorities agree with one another, we find that all their experiments show that the greater the quantity of gas passed through, the greater is the irregularity of the meter. This being granted, let us examine their figures.

Mr. Cleminshaw found that, with a consumption of	7½	cubic feet,	it gained	1·8	per cent.
Mr. Hawksley	,,	,,	10	,,	,,	1·0	,,
Mr. Cleminshaw	,,	,,	15·2	,,	,,	3·55	,,
Mr. Evans	,,	,,	15	,,	accurate		
Mr. Cleminshaw	,,	,,	20½	,,	it gained	6·0	,,
Mr. Evans	,,	,,	21	,,	,,	2¼	,,
Mr. Wright	,,	,,	25	,,	,,	7½	,,
Mr. Cleminshaw	,,	,,	28	,,	,,	5·99	,,
Mr. Cleminshaw	,,	,,	29½	,,	,,	6·18	,,
Mr. Hawksley	,,	,,	30	,,	,,	3½	,,
Mr. Evans	,,	,,	31	,,	,,	3·1	,,

* A proverb which, in English, is equivalent to saying "You are in the trade."

In truth, these results remind us of the answers given as to the quantities of the various products of the distillation of coal by the English engineers, whom the old companies for lighting Paris consulted, in order to rebut the allegations of M. Regnault—answers whose unanimity was such that the solution of the question was much more difficult after receiving them than before! However, we must make them agree in some way or other; and this is the more necessary, because the same meter (No. 49,824) was used in all the experiments, and also because it had but one mode of operation.

As to ourselves, who have recently devoted nearly an entire number to a very minute description of Crosley's meter—a description which, according to our usual custom, was only given after repeated experiments—we could not believe our eyes on reading these reports; and without letting any person into the secret, we went immediately to the manufactory of Thernes (Messrs. Panis and Gregory, Crosley's French licencees), and we took a meter of their manufacture not yet stamped, and put it in operation, checking the indications by the gasometer and the standard meter. Our experiments thus made, with a 5-light meter, gave us the following results:—

Using 4·2 cubic feet an hour (1 light), the indications were perfectly accurate.

Using 5·8 cubic feet an hour (rather more than 1 light), the indications were perfectly accurate.

With 16·4 cubic feet an hour (the usual consumption of 4 lights), the indications were perfectly accurate.

With 26·5 cubic feet an hour (a little more than 6 lights), the indications were ½ per cent. too high.

With 54·1 cubic feet (13 lights), the result was complete accuracy.

There it would have been proper that our experiments should stop, for the meter is made for a determined quantity, which evidently it cannot exceed without alteration, any more than a balance made for a maximum weight of 100 lbs. can support 120 lbs. without being bent or broken.

Increasing, however, the pressure from 1·4 inches to 2·88 inches, we consumed at the rate of 15·4 cubic feet of gas per hour, with a gain of one-third per cent. only.

Is that an inaccuracy, when the authorities tolerate a gain or a loss of 1 per cent.?

Passing, then, to comparative experiments with a meter made in one of the best manufactories of France, we put them both between the gasometer and the standard meter; in that position they were subjected to repeated trials, and they both indicated the same consumption.

Then, in the course of one long experiment, we varied their action, so to speak, causing the passage through them of the necessary supply of gas, sometimes for 2, 8, 10, 5, 6, &c., lights; they always coincided.

Finally, we increased the pressure to the enormous height of 3·6 inches; in this case they consumed 52·8 cubic feet, and the quantity registered varied in the two meters by only an inappreciable fraction.

A further trial remained, which was to alter the level of the water equally in the two meters simultaneously. For that purpose, a receiver having been selected, it was filled with water, and emptied into the two meters.

Under the influence of this increase of water, the common meter began to gain, whilst Crosley's meter, by virtue of its surplus-water reservoir, which received the excess of water, registered accurately: only it was observed that when the water was able to get into the syphon, the passage of the gas was intercepted; but the ordinary meter then showed an advance of 8 per cent.

The reverse experiment was made: the common meter was able to work in spite of the lowering of the level, but it indicated a retardation of from 2 to 3 per cent. at the moment that the valve closed; whilst Crosley's meter continued to work accurately, its construction only allowing of the extraction of the water of the lower reservoir from the overflow.

Evidently, Crosley's meter is quite accurate. Why, then, do our neighbours insist upon the contrary? Why? we have given the answer in our last number, and the fact seems to us to be proved.

Indeed, what could be the reason for using a 3-light meter rather than one of a larger size?

Everybody knows that the smaller the meter, the less accurate it is in its indications; the effect of the pressure being more observable in small than in large meters. This is the reason why the authorities refuse to stamp meters of 1 or 2 lights; it is also the reason why the 5-light meter comes in order after a meter of 3 lights; the working of the latter, on account of its small size, being often liable to interruption by the passage of too great a quantity of gas. If it had not been for this difficulty, the 3-light meter would have been made capable of supplying a greater number of lights, and thus would have rendered the 5-light meter useless.

It was, then, absurd to use a 3-light meter with a consumption of 5, 6, 7, 8, 14, and up to 17 lights. If the gas-works commit what we consider to be the serious error of tolerating upon a meter a number of lights which ought to pass through an instrument of greater power, they have no right to find fault with this meter on account of its inaccuracy.

The dimensions of meters are calculated by long experience. The intervals between the numbers have been selected according to the additional number of lights which the meters could bear, and the quantity of gas which their orifices allowed them to deliver.

Meters, therefore, of 3, 5, 10, 20, 30, 50, 80, 100, 150 lights, and upwards, are constructed, and their dimensions have been fixed, after deliberate investigation.

The stamped meter is a legal measure, like the mètre and kilogramme; and it cannot be with impunity applied to the measurement of a greater quantity than that for which it is constructed.

But to return to Crosley's meter, the description of it which we published last July was sufficiently clear and explicit to refute the allegations against its mechanism, and the amount of pressure requisite to put it in motion. Whatever may be said upon the subject, the agents of the public authorities of Paris are well able to appreciate the correctness of its working; and it was only after long and severe examination that it was allowed to be stamped by them.

(Signed) EMILE DURAND.

METROPOLIS GAS INQUIRY.

REPORT OF THE MANAGERS APPOINTED BY THE DELEGATES FROM THE VARIOUS METROPOLITAN VESTRIES AND DISTRICT BOARDS.

At a meeting of the delegates on the 10th of August last, it was resolved that the managers appointed by them to conduct the inquiry before the parliamentary committee on the subject of metropolis gas supply, be requested to prepare a report showing the present position of the metropolis gas question, and the prospects which may reasonably be entertained with respect to the future.

Before proceeding to the subjects more immediately referred to in this resolution, the managers propose briefly to state the circumstances which gave rise to their appointment, and which originated the inquiry before the parliamentary committee of last session.

Up to a comparatively recent period, the metropolis had been supplied with gas by a number of companies, which had been incorporated for this purpose by Acts of Parliament, ranging over a period of nearly fifty years. The first Act was that of the Chartered Company in 1810, and the most recent, that of the Surrey Consumers', which passed in 1854.

The gas companies which, from time to time, have obtained legislative power to supply the metropolis, have not, as in most provincial towns, been confined to separate districts, but have, in many cases, sought for power to supply gas in districts already lighted by other companies. Thus the Chartered Company, the first which was established, obtained power to light the cities of London and Westminster and the borough of Southwark. The City of London Company, which was the next incorporated, obtained power to light precisely the same districts which had been assigned to the Chartered, thus entering the field as a direct and undoubted competitor with the former company.

In the same way, most of the other companies, although in many cases including new districts, yet obtained parliamentary power to extend over large areas which had previously been assigned to other companies. Throughout the whole continuous process of gas legislation for the metro-

polis, the principle of competition has been distinctly recognized, and to such an extent has this principle been carried, that some districts had no less than four companies competing with each other, or at all events possessing parliamentary powers which would enable them to compete at any time.

Besides the thirteen or fourteen companies having Acts of Parliament empowering them to lay down pipes and light the metropolis, there is at least one other large company, the Western, constituted under the Joint-Stock Companies' Acts, and which possesses no parliamentary powers to break up streets over a considerable part of the district which it lights. In fact, the only parliamentary powers possessed by this company at all, are acquired by virtue of a purchase which it has made of the works of another company.

Owing to the extensive system of competition which had been, as it were, voluntarily organized amongst the London gas companies, the Legislature appears to have considered it unnecessary to introduce into their Acts many of those clauses and provisions for the protection of the consumers which are usual in all modern gas Acts. In the first place, many of the London companies' Acts are, comparatively speaking, so ancient, as to have escaped that scrutiny with which more recent applications to Parliament have been visited; and again, it is an admitted fact that the competition existing amongst the metropolitan gas companies has actually been productive of some great reductions in favour of the consumers, which have been generally followed throughout the country.

It is curious to remark the rapid and easy stages by which each new gas company established in London passed from the position of a popular and anti-monopolist company into the ranks of a coalition against the public.

Thus the London and the Equitable Companies were successively established, the first in , and the latter in 1842, confessedly as competitors of the Chartered Company.

Notwithstanding this, we find the whole three companies seeking to amalgamate in 1850, and going to Parliament for an Act to destroy all competition in the West-End parishes. At that time the Western Company, then newly established, stood alone in opposition to the combined companies. This company, having no parliamentary powers, was actually allowed to introduce its pipes into Kensington, St. James, Westminster, and several other parishes, on the distinct understanding that it would continue to compete with the attempted monopoly of the day.

It is scarcely credible, that this Western Company, which gained a footing under such peculiar circumstances, is at this present time, nearly eight years afterwards, the accredited leader of a combined movement for a more gigantic amalgamation than ever; and that the officers and directors of this company have the credit of originating and carrying out the present combination of the gas companies, with the view of establishing a more sweeping monopoly than was ever before attempted.

Opposition to the threatened Gas Monopoly of 1857.

It appears that, during the early part of 1857, negotiations had been going on amongst the principal gas companies on the north side of the Thames with reference to an exchange of districts, and the withdrawal by certain companies from places where a competition had existed. The final completion of these districting arrangements was first publicly announced in the directors' report presented to the shareholders of the London Gas Company at their half-yearly meeting on the 14th of October, 1857. This was followed by similar announcements at meetings held shortly afterwards by the other companies who were parties to the arrangement, namely, the Imperial, the Chartered, the Western, and the Equitable.

This important step of the gas companies was also prominently brought under the notice of several metropolitan vestries and district boards about the middle of October, when the Equitable Company declined to tender for lighting Marylebone, and the London Company, in a similar manner, declined to tender for lighting the Westminster district. The prices demanded for lighting the areas which the gas companies had thus arbitrarily monopolized, were, in most cases, considerably in excess of those which had hitherto been paid, in addition to which the companies seemed determined to show themselves masters of the situation, by prescribing, on the one hand, terms of their own, and refusing, on the other, to acquiesce in conditions which had always been imposed in former contracts.

So much with respect to the public lighting, while, at the same time, there were many complaints on the subject of meters and their improper registration; unjust and arbitrary exactions by the companies of arrears due by former tenants; and in certain districts, conditions of a most extraordinary character were required to be signed by the householder before the company would supply gas at all. Not to dwell, however, on the list of grievances already existing, or on those which were likely to arise in future from the monopolizing arrangements of the gas companies, suffice it to say that these arrangements excited so much attention in the metropolitan vestries and district boards, that meetings began to be held on the subject with the view of taking steps to check the contemplated encroachments of the gas companies.

It was easy to see that the metropolitan gas companies, relieved from the constraint of competition, and bound down neither to a maximum price nor to a limitation of dividend, would have it in their power to impose, to any extent, on the consumer, and among the other evils which these public bodies apprehended, was a speedy and general rise of price, either in the shape of a direct addition, or of deteriorated quality in the gas supplied. They foresaw that this movement of the gas companies, while it relieved them from what they are pleased to call the evils of competition amongst themselves, was entirely unfettered by any of those restrictions which throughout the length and breadth of the country are invariably imposed on every gas company enjoying the monopoly of lighting a town, and which restrictions even prevail in many large provincial towns when lighted by more than a single company.

[The report then records at considerable length the proceedings of the delegates from the first movement on Nov. 19 to the meeting on May 31—full reports of which were, at the time, published in this JOURNAL—and proceeds to say:—]

The honorary secretaries were directed to communicate with Dr. Odling, Mr. Leigh, of Manchester, and Mr. Cleminshaw, engineer of the Manchester Corporation Gas-Works, as to scientific evidence.

They were also directed to take steps for testing the consumption of gas by the public lamps in those districts where the surveyor or other officer should be directed to make the necessary observations on the pressure of the gas.

Accordingly, on the 3rd of June, the following circular was addressed to the clerk of each vestry or district board throughout the metropolis:—

June 3, 1858.

Sir,—The managers appointed by the delegates from the various metropolitan vestries and district boards to conduct the inquiry before Mr. Byng's committee in the House of Commons, have passed a resolution that it is highly desirable to bring forward evidence as to the actual consumption of the street lamps, in order to show that in many cases the public is at present paying far too high a price to the gas companies.

The managers are of opinion that evidence as to this consumption would be most conveniently obtained through the agency of the surveyor, or such other officer as each vestry or board might choose to appoint for this purpose.

They are informed, and believe, that a series of observations extending over not less than a week, and made in conformity with a settled and uniform scheme to be previously arranged, would enable the managers to prepare conclusions as to the consumption of the street lamps throughout the metropolis, which will have a most important bearing on the question of gas supply.

The managers believe that in addition to the surveyor, or some other qualified officer, the services of an intelligent gas-fitter would be requisite, and also those of several ordinary labourers.

We should feel obliged if you will inform us whether your surveyor, provided with this assistance, will undertake the charge of this matter, when we will forward him suggestions as to the mode of making the observations.

We are, Sir, your obedient servants,

JAMES BEAL,
SAMUEL HUGHES.

Offices, 209, Piccadilly.

Answers were received from the vestries and district boards of the following places to the effect that their surveyors would undertake the observations on pressure, and requesting to be furnished with the suggestions referred to in the circular of the 3rd of June:—

Fulham,	St. Mary, Newington,
St. Giles,	Strand,
St. Luke, Chelsea,	Wandsworth,
St. Mary, Lambeth,	Westminster.

A copy of the suggestions was accordingly transmitted to the respective surveyors of these vestries or boards.

[The report then narrates the proceedings preparatory to the meeting of the parliamentary committee, and continues:—]

Proceedings before Committee of the House of Commons.

This committee met for the second time on the 17th of June, when it was decided that the case of South London should be taken first.

Dr. Challice was accordingly called and examined by Mr. Locke. He was then examined in succession by Sir William Hayter, Sir Benjamin Hall, and other members of the committee.

The evidence of Dr. Challice chiefly related to grievances which had already been experienced on the south side of London, from previous districting arrangements among the gas companies. He said that, up to the year 1849, the Phœnix and South Metropolitan Companies alone supplied Southwark. About that time the Surrey Consumers' Company was established, and for several years, namely, till 1853, they had the benefit of competition from four companies, namely, the Phœnix, the London, the South Metropolitan, and the Surrey Consumers'. During these years of competition the price of gas was reduced to 4s. per 1000 feet. In 1853, however, an arrangement took place among the companies, exactly analogous to that now proposed on the north side of the river, and by this arrangement each company took a separate district, and bound itself not to supply gas to the customers of any other company. "Soon after this arrangement took place," says the witness, "the price of gas was raised to 4s. 6d.; and it was a general impression that this was the first fruits of the districting." Dr. Challice went at some length into complaints which had been made by gas consumers in 1855, when the companies made an unsuccessful application to Parliament for an Act to legalize their arrangements.

1. They complained that though the price had been reduced to 4s. 6d., the gas bills of the consumers were more than when the price was 6s.
2. That they were made to pay for gas which had been consumed by former tenants.
3. That the gas was frequently cut off by the companies on the most trivial dispute with the consumer (in one case the gas was cut off on Saturday night, and the consumer left in darkness, in consequence of a dispute about 1s. 6d.).
4. These grievances existed in 1855, and no remedy has been applied to the present time.

With reference to the other grievances now existing, "we complain," says Dr. Challice, "that a man is obliged to pay for gas to a certain amount, whether he consumes that quantity or not; that a mechanic, if he wishes to have the gas, must pay either £1. 10s. or £2 per annum. £1. 10s. is the minimum; and if he only burns 1000 feet of gas, he is charged the whole £1. 10s."

After giving several instances in which complaints Nos. 2 and 3 had arisen, Dr. Challice proceeded to complain of the registration of meters, and said that, while the bills increased, the gas gave less light than formerly.

He said it was perfectly notorious that the gas was of very low illuminating power, although certified by the company to be above the parliamentary standard.

This raised the question as to whether the gas tested by the company was the same as that supplied to the public, and showed the necessity for tests being applied at points of supply, distant from the works of the company. The evidence of Dr. Challice embraced many minor questions, but the above are the principal points requiring notice.

The third meeting of the parliamentary committee took place on the 22nd of June, when the examination of Dr. Challice was completed, and Mr. William Crosley, the meter manufacturer, was called and examined by Mr. Locke.

The evidence of Mr. Crosley was entirely confined to the subject of meters, and showed that a very large proportion of those at present used by the gas companies can be made, by overfilling, to register very considerably against the consumer. It has hitherto been supposed, that if a meter be tested by an inspector and found to register correctly, the consumer is thereby protected, and cannot be made to pay for more gas than is actually consumed. Mr. Crosley's evidence went to show that this is an entire mistake, and he demonstrated clearly to the committee that the construction of most wet meters was such that, although registering correctly at the proper water-line, they could be, and often were, so overfilled with water by the inspector, as to register immensely against the consumer.

At the fourth meeting of the committee, which took place on the 29th of June, Mr. Crosley's evidence was continued, and he then handed in a table, showing the result of testing 36 meters in Manchester. Out of these 36 meters, no less than 24 were found to be overcharged with water, and to register against the consumer. Of these 24, there were 5 which registered from 1 to 2 per cent. against the consumer, 9 which registered between 2 and 5 per cent. against him, four which registered between 5 and 10 per cent. against him, and six which registered more than 10 per cent. against him. Among these last six there was actually one which registered 35 per cent. against the consumer, and another registered 28.

Such was the state in which the meters were actually working in Manchester, the meters being tried just as left by the inspector. But the subject has yet another aspect, namely, the extreme error which meters of this vicious construction are subject to, when overfilled as much as they will bear. To determine this point, Mr. Crosley had tried, since his previous examination, the meters of no less than six London makers, and now gave the result as follows:—"When filled to the top of the waste-pipe or spout, one meter was found capable of registering 64 per cent. against the

consumer; the next 38, the next 17, the next 11, the next 10, and the sixth 9 per cent.—all against the consumer." It appeared, from the evidence of this witness, that great numbers of meters are habitually overfilled with water, as, when sent to him to repair, the levels at which the water has been standing are plainly to be seen; and this was pointed out to the committee in several meters, which had been opened for the purpose. The general result of Mr. Crosley's evidence was to show that any system of meter-testing at present in use was utterly inadequate for the protection of the consumer. The officer appointed to test, merely tries the meter at the proper water-level, at which it may probably register with accuracy, but he never tries it with the measuring chamber reduced in capacity by overfilling. In other words, he tests the action of the meter when properly used, not when improperly. All that his testing implies is, that the instrument *can* be made to register correctly, but he gives no security or confidence to the consumer that it will not register very seriously against him.

The consumer requires, in fact, a test which shall prevent the use of meters of vicious construction—of meters which can, by any overfilling or other contrivance be made to register against him.

The fifth and last meeting of the parliamentary committee was held on the 6th of July, when Mr. Slee, a manufacturer in Bermondsey, was examined to show the gradual increase which had taken place in the gas bills of consumers within the last few years, and which witness could only account for by supposing the gas had deteriorated in quality.

Before the examination of this witness, the chairman of the committee announced the following resolution:—

The committee, in consequence of the lateness of the session and the impossibility of concluding the inquiry this year, will not proceed to hear further evidence after the examination of Mr. Slee shall have been concluded; but at the conclusion of this day's proceedings, the committee will recommend to the House its reappointment at the commencement of next session.

Thus the parliamentary inquiry of this year terminated with the evidence of Mr. Slee.

Proceedings of the Managers with the View of collecting Evidence.

Previous to the appointment of the managers, a very valuable document had been prepared from returns furnished by numerous vestries and district boards as to the prices paid for their public lights, and the terms on which they were supplied by the various companies. It appears from these returns that the prices paid for lamps burning from sunset to sunrise throughout the year, and consuming 5 feet an hour, vary from £3. 1s. 6d. to £6. 16s. per lamp; and there appear to be equal inconsistencies in the prices charged by the gas companies for smaller descriptions of burners*. It is reasonable to suppose that under the new monopoly created by the gas companies, and the absence throughout the metropolis of all competition, an attempt will be made by the companies to assimilate their charges for public lighting, and to raise these charges up to the maximum, or nearly the maximum, amount which now prevails.

Indeed, at some of the recent meetings of the gas companies, the most undisguised intentions have been expressed to this effect.

At an early period of the parliamentary inquiry, it came to the knowledge of the managers, that the gas companies had been instilling into the minds of their friends in the committee an impression that the capital invested in the metropolitan gas-works was paying a very low rate of interest, and one of the members was heard to declare, on more than one occasion, that the whole of the large capital so invested was paying a dividend of only 2 per cent. In order to test the truth of these statements, and be prepared with evidence to show how widely different is the real state of the case, an elaborate investigation has been made of the accounts of the principal metropolitan companies, as presented at the last five half-yearly meetings; and the result of this investigation will show the committee of Parliament in the next session that the aggregate gas property has for some years paid an interest of nearly 7 per cent. on all share capital, and that the actual dividends have been more than 6 per cent.; so that the capital invested in gas-works has been attended with much larger profits than that invested either in railways†, water-works, or other similar undertakings.

The analysis of the accounts which have been made, also shows to what a large extent some of the gas companies are burdened by extravagant expenditure of capital in proportion to the capacity of the works, and demonstrates the unfairness of taxing the public with a price for gas calculated to pay interest on a swollen and exaggerated capital, while at the same time the managers concede the principle, that a legitimate and fair expenditure of capital is entitled to a moderate and ordinary rate of interest.

Under this head, an analysis of the accounts shows that while one of the London companies has only expended about £240 of capital for each £100 of gas rental, other companies have expended more than £400, and one company actually nearly £600 for each £100 of gas rental. This calculation is made after reducing the gas rental of each company to the same standard, and shows the utter impossibility of any price that would be fair to the consumers paying an ordinary or satisfactory rate of interest to a company whose capital is so monstrously disproportionate and exaggerated. The consumer can afford to pay a price for gas which will remunerate those companies whose capital is moderate and reasonable, but can never be called on or expected to pay the price which would be required to remunerate gas companies for reckless and wasteful expenditure of capital.

During the progress of this inquiry, the gas companies, through their various organs and representatives, have endeavoured to show the injustice of a fixed price for an article whose cost is affected so largely by the varying prices of coal, iron, and other materials used in the manufacture. The analysis of the accounts presented half-yearly to their own shareholders will show how ill-founded are the assertions which have been made on this head, and within what small limits the price of gas ought to vary according to the ruling price of coal and coke.

The evidence drawn from the accounts of the gas companies, themselves, and a comparison with great numbers of provincial towns, where the absolute cost of coal is greater, and the price of gas is less, are abundantly conclusive as to the maximum prices proposed by the managers being amply sufficient to remunerate the London gas companies. In fact, these maximum prices are sufficient to pay liberal dividends, and afford a considerable margin to meet any probable rise in the price of coal and iron.

In the preparation of evidence, the efforts of the managers have been directed primarily to support *seriatim* all the allegations made in the petition agreed to by the delegates, and to furnish solid and satisfactory grounds to the parliamentary committee for adopting every one of the clauses proposed by them for insertion in a general Act.

In order to prove the present unsatisfactory state of the gas supply, they have prepared evidence under the following heads:—

1. Complaints of private consumers as to arbitrary acts of the gas companies in cutting off gas, requiring payments of arrears from in-coming tenants, &c.
2. Complaints as to increase of gas bills without any reasonable cause, deficient supply of gas, &c.
3. Enormous impositions in the public lighting in consequence of the price charged for public lamps.
4. Increase of demand made by companies for public lighting immediately after the districting, and continued to the present time whenever a new contract is to be made.

Under each of these heads a large mass of evidence has been collected, but the managers will only allude in the present instance to the public lighting, which from the concentrated nature of the grievance, and the large sums paid by the various metropolitan boards, assumes a position of unusual prominence.

The instructions given to the managers for the purpose of testing the consumption of the public lamps have been already alluded to. In pursuance of those instructions a series of experiments has been made on the gas lamps of the following parishes:—

Battersea,	St. John, Westminster,	Newington,
Chelsea,	Lambeth,	Streatham,
Clapham,	St. Margaret, Westminster,	Wandsworth.

In one or other of these various parishes the consumption of lamps lighted by the following companies has been tested and examined:—

The Equitable,	The London,	The Mitcham,
,, Western,	,, Wandsworth,	,, South Metropolitan,
,, Chartered,	,, Phœnix.	

In most of the contracts for lighting entered into with the gas companies, it is stipulated that the public lamps are to burn 5 feet an hour; but it was found that, in most cases, this rate of consumption was maintained only during a few hours after sunset. Generally speaking, a great diminution in the light of the public lamps takes place about 10 o'clock, when most of the shop lights are extinguished, and the consumption by meter is considerably diminished. A further diminution of light takes place about midnight, and from this time till sunrise, the pressure maintained in the mains is so small that the consumption falls very far below 5 feet an hour—in some cases as low as 2 feet.

Another important result of these experiments is to show that the public bodies pay for the gas in the street lamps a much higher price than that charged to private consumers.

The gas companies have been in the habit of defending the price charged for public lamps by declaring that they consume at least 20,000 feet per annum, which at 4s. amounts to £4 0 0
To which they add for cleaning, lighting, extinguishing, and repairing 0 15 0
Total £4 15 0

making £4. 15s. for each lamp, and they take credit to themselves for supplying at a lower price than this in certain cases, although the returns for the various parishes show that prices as high as £6. 16s. are paid in some of the suburban districts. The experiments, however, which have been made, bring to light the startling fact, that instead of consuming 20,000 feet a year, the lamps in certain parishes consume no more than 10,000 feet, and in no instance, except one, namely, those of the Phœnix Company in Battersea, were the public lamps found to consume so much as 20,000 feet per annum.

The exceptional case of the Phœnix lamps in Battersea, is one in which the parish pays an enormously high price for the lamps—a price which, at 4s. a 1000, would be equivalent to more than 26,000 feet of gas per annum.

The general results, which have been arrived at in the experiments on public lamps, are given in a table annexed to this report, and a comparison between the prices actually paid, as given in column 6, and the price which should be paid at 4s. and 3s. 3d. per 1000 feet respectively, will abundantly show what an unfair and extraordinary charge is made for the public lighting, even assuming a price as high as 4s. per 1000 feet. It will be seen that the overcharge varies per lamp from 10s. to more than 50s., and applying this result to the whole metropolis, it will not be unfair to assume that an overcharge of one-fourth is established.

The public lighting of the metropolis does not cost less than £240,000 a year, so that, speaking within bounds, it appears clear, from the preceding statements, that an overcharge is now made by the gas companies of not less than £60,000 a year on the public lighting alone.

The managers refer to the evidence of Mr. Crosley on the subject of meters. This witness, although called and examined by Mr. Locke, in the course of his Southwark evidence, is rather to be considered as a witness on the general subject of the metropolitan grievance. The managers would have preferred his evidence distinct from the peculiar grievances of the Southwark consumers. They however considered his evidence so important that they advanced him a sum of £12 to procure a supply of meters from a number of London makers. The meters were tested by him accordingly, with the extraordinary results which have been before alluded to, and which are more particularly described in his evidence.

Review of Parliamentary Proceedings.

In looking back upon the very small advance which has been made in this inquiry, it will naturally be expected that something should be said by the managers as to the impression produced on the parliamentary committee by the evidence already adduced. In forming a judgment on this subject, it is necessary to bear in mind the peculiar nature of the inquiry, and the large and important interests which it affects. The people of Southwark have not chosen to make common cause with the delegates from the rest of the metropolis, but preferred to present a separate case, and to appear before the parliamentary committee not acting in concert with the other metropolitan districts.

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* Mr. Wright, the engineer of the Western Gas Company, stated in his evidence on the Imperial Gas Bill, in 1854, that the prices charged by the Western Company for public lights ranged from £3. 3s. to £4. 15s.; that the profit on the price of £3. 3s. was 13s. or 14s. per lamp after all charges were paid; that his company derived a larger profit from the public lights than from the private consumers; and that £3. 10s. is a fair and profitable rate as an average for the public lamps.

† From the recent report of Captain Galton to the Board of Trade, it appears that the following are the rates of dividend which have been paid ever since 1849, on the £237,000,000 sterling invested in the share capital of railways in Great Britain and Ireland.

	£	s.	d.	
In 1849	1	17	6	per cent.
,, 1850	1	16	6	,,
,, 1851	2	8	9	,,
,, 1852	2	8	0	,,
,, 1853	3	1	0	,,
,, 1854	3	8	0	,,
,, 1855	3	2	4	,,
,, 1856	3	8	0	,,
,, 1857	3	12	0	,,

The above shows that railway property pays only half as much per cent. as the capital invested in metropolitan gas-works.

Thus the character of unity and compactness which the case might have presented if it had been under one management, has been, in some degree, infringed upon. At the same time, the managers believe, notwithstanding this irregularity in the arrangement of the evidence, that the whole will be found in the end to combine and harmonize, and that the facts will all, finally, be as effectually brought out as if they had been more perfectly arranged. The managers are not responsible for the isolation of the Southwark case, which they would have preferred to amalgamate and incorporate with their own, and it is possible, had an opportunity been given to revise or rehearse, that some of the evidence which was, perhaps, too zealously prosecuted on the part of Southwark would have been withheld.

On the whole, however, the witnesses called to prove the local grievances of Southwark have shown the effects of a previous combination of the gas companies on the south side of London, which clearly foreshadow and indicate what will probably follow throughout the whole metropolis; and they have also, to a great extent, supported all the allegations which composed the bill of indictment introduced by Dr. Challice.

The remarkable evidence given by Mr. Crosley on the subject of meters, shows beyond all question, the necessity for a much more perfect and scientific test than that which is imposed at present. This evidence has already attracted much attention in Manchester and other places, and has already, in some degree, checked the introduction of the vicious instrument whose errors and injustice he exposed so ably.

On the whole, therefore, the managers have no reason to be discouraged with the inquiry so far as it has hitherto proceeded. All extensive parliamentary inquiries of this nature are more or less discursive, and the truth often lies enveloped in much that is unnecessary and irrelevant; but they trust to the judgment and good feeling of the committee to give their calm and patient attention to this important inquiry, in which they do not despair of bringing out all the facts necessary to support their petition and the propositions they have put forward.

Prospects for the Future.

The managers have been much restricted hitherto for want of funds. In an inquiry of this nature, when such a powerful interest as that of all the London gas companies is banded together against the public, it is reasonable to suppose that no expense will be spared by them to procure the very highest assistance of every kind in aid of their cause.

It is due to the importance of the subject that the representatives of the public should be equally prepared, and in order to conduct the inquiry properly, some able assistance should be had for the purpose of arranging and preparing evidence; and some professional witnesses of first-rate skill should be employed to corroborate and extend the evidence as to the public lighting and illuminating power of the gas at present supplied, and the price which should be fixed for supplying it in London.

The analysis of the gas companies' accounts has been already alluded to as extending over five half-yearly periods, or two and a half years. The managers recommend that, in the interval between the present time and the next session, this analysis should be extended, so as to embrace, if possible, at least the last ten years, in order to show the complete financial working of the London gas companies, according to a scale and pattern which has already been worked out for a short period.

A fixed contribution from each vestry and district board would not be fair to the smaller and poorer districts; but it is proposed that each should pay according to its rateable value—say one farthing in the pound on that value. This would raise a sum of several thousand pounds, according to the number of districts which contribute, and would be sufficient to carry on the inquiry with vigour.

The managers deem it important that vestries and district boards should carefully consider the additional annual cost likely to be incurred, should this monopoly remain unchecked. This is estimated at an increase of one-fourth of the whole gas rental of the metropolis, or nearly £500,000 sterling per annum; and they are invited to consider the trifling outlay recommended as a wise and prudent expenditure to resist a tax so oppressive and unjust.

They also suggest, as worthy of consideration, that the settlement of the gas question for many years to come will depend on the evidence adduced before the committee; and they press the urgent necessity of strengthening the hands of those to whose care is entrusted this most important inquiry.

Numerous suggestions for a compromise were made; but the managers regret to have to report that, on the part of the gas companies, every effort was made to exact an exorbitant maximum, and to paralyze the future efforts of consumers in dealing with this necessity of life; and that every endeavour honourably to terminate this strife, was met by a series of attempted exactions deeply to be regretted.

The managers recommend the appointment of themselves, or of a new committee, to conduct the inquiry in the ensuing session, and in the meantime to arrange and prepare evidence.

They consider it of the highest importance that any body appointed for this purpose should meet during the winter at least once a week, and should hear *vivâ voce* from the witnesses themselves, such evidence as they are prepared to give, both on the scientific and other branches of the inquiry.

They have received already a large mass of evidence from several parishes, and they now invite the communication of every cause of complaint and every species of information from the various public bodies and individuals throughout the metropolis.

They also take this opportunity of urging the importance of further experiments on the street lamps. They consider that in those parishes where experiments have been made in the summer, another series should be made during the long nights of the present winter; and especially they invite the attention of those boards who have had no experiments made, to the great importance of this subject.

On application to either of the honorary secretaries, the suggestions as to the mode of making the observations on pressure will be immediately forwarded to the surveyor of any board applying for the same, and every necessary information will be afforded to enable them to make the observations.

The managers would also urge the necessity, in various parts of the metropolis, of trying the illuminating power of the gas supplied by the companies. Should the managers be provided with the necessary funds, they will not fail to have experiments of this kind made by their own proposed scientific witnesses; but, in addition to this, they would be glad to have corroborative evidence from any board or vestry which will instruct its own officers or other qualified persons to make these experiments. The managers think it right to observe that this and similar efforts are naturally expected by the parliamentary committee, who asked, on more than one occasion, with some interest, whether such experiments had been made in Southwark, where, as in other places, the defective quality of the gas is complained of.

If these suggestions be carried out, the managers have no fear of the result in the next session, and they will confidently look forward to the complete establishment of all the allegations they have made, and the perfect redress of all the grievances they have called on Parliament to remedy.

By order of the managers,

JAMES BEAL
SAMUEL HUGHES } Honorary Secretaries.

APPENDIX.

At a meeting of the managers appointed by the delegates on the subject of metropolis gas, held at the Court House, Marylebone, June 11, 1858, Dr. BACHHOFFNER in the chair, it was resolved—

That the following clauses be proposed for insertion in a bill to be introduced into Parliament on the subject of metropolis gas:—

1. That the Gas-Works Clauses Act, 1847, shall be incorporated with and form part of this Act, save in so far as any of the provisions of the said Act may be expressly modified by this Act.

As to Limitation of Dividend.

2. This has been usual in all gas Acts, and where no prescribed rate is fixed, sections 30 to 35 of the Gas-Works Clauses Act come into operation.

Resolved,—That these clauses are objectionable, because they allow a dividend of 10 per cent. to be spread over the whole works from the commencement. The managers suggest a sliding scale of dividend in the inverse ratio of the price of gas. —*See Sheffield Gas Act*, 1855, *sec.* 42.

3. The company shall, at the expense of the owner or occupier of any public or private building or land who requires the same, lay all necessary pipes to communicate with the company's mains, and furnish such person with a supply of gas for the purpose of lighting or being used in such building or land, and also (if required by him) with a meter, not being more than a 60-light meter, for ascertaining the quantity of gas consumed by him, so as the person requiring such pipes to be laid, or such supply of gas or such meter to be furnished, shall, if required by the company, before he shall be entitled thereto, give such security in addition to that given by this Act, for payment to the company of the expense of and incident to the providing, laying, and repairing of such communication-pipes, and for the gas to be so supplied and for such meter, and the rent thereof, as the company think fit.—*Sec.* 85, *Sheffield Gas Act*, 1855.

4. If the company and the person so requiring such pipes, or gas, or meter, cannot agree upon the security to be so given, the same shall be determined by a justice or justices; and any justice or justices shall, on the complaint and application of the company and such person, or either of them, determine the amount and nature of the security to be so given, and the decision of such justice or justices shall be final and conclusive, and such security may be the deposit or prepayment of money.—*Sec.* 86, *Sheffield Gas Act*, 1855.

5. If the company, after the justice or justices have settled and decided the amount and nature of the security to be so given, and after such security is given or tendered to the company, wilfully fail for such number of days, not less than seven, from the giving or tendering such security, as the justice or justices shall appoint, or if the company shall not require such security, and shall fail for seven days after request in writing by such person to provide and lay such communication-pipes, and to furnish such supply of gas or such meter, then, and in either of such cases, the company shall forfeit to such person twenty shillings for every day during which such failure continues.—*Sec.* 87, *Sheffield Gas Act*, 1855.

6. In case any consumer of the gas of the company shall leave the premises where such gas has been supplied to him without paying the company for the gas so supplied, the company shall not be entitled to require from the next tenant of such premises the payment for the gas left unpaid for by the former tenant, unless such in-coming tenant shall have undertaken with the former tenant to pay or exonerate him from the payment of such arrears for gas, but the said company shall supply their gas to such in-coming tenant upon the usual terms and conditions, upon being required by him so to do.—*Sec.* 15, *Imperial Gas Act*, 1854.

7. That each vestry (or one or more vestries or district boards may combine for the purpose) shall appoint a chemical examiner, or other competent porson, who shall, as often as may be necessary during the week, examine the quality, the illuminating power, and the pressure of the gas so supplied, and shall present a monthly report to the vestry or vestries, or board or boards, stating the number of examinations made during the period, and the quality, illuminating power, and pressure of the gas so supplied.

8. The quality of the gas, as regards its illuminating power, shall be such that an argand burner having 15 holes and a 7-inch chimney, consuming 5 cubic feet per hour, shall give a light equal to the light of 12 sperm candles of six in the pound, each burning 120 grains per hour; and the gas so supplied shall be free from ammonia, bisulphide of carbon, sulphuretted hydrogen, and other deteriorating agents.

9. A pressure of not less than ten-tenths or one inch head of water shall be maintained at all times on the service-pipes of the company.

10. If the gas supplied by the company shall at any time be of a less illuminating power than the same ought to be (the standard of such illuminating power being the standard hereinbefore mentioned), or if the gas shall at any time contain ammonia, bisulphide of carbon, or sulphuretted hydrogen, in sufficient quantity to colour the usual test-papers, or if the gas at any time shall have a less pressure in the service-pipes than the pressure of one inch head of water hereinbefore mentioned, the company shall forfeit for every such offence the sum of one hundred pounds; and also, in addition to the said penalty of one hundred pounds, and whether such penalty shall have been received or not, the sum of ten pounds for each day after notice in writing from any vestry or district board having by law the control, direction, or management of the lighting of any parish or place within the limits of the company's Act, during which any or either of such offences shall continue: all which penalties shall be recovered, with full costs of suit, in any of the superior courts, by the said vestries and district boards; but no penalty shall be recoverable unless it be sued for during the continuance of the offence, or within six months after it shall have ceased.—*Sec.* 18, *Imperial Gas Act*, 1854.

11. It shall not be lawful for any company to charge for gas whose illuminating power from a 5-feet burner is less than 18 sperm candles, each burning 120 grains per hour, a higher price than 4s. 6d. per 1000 cubic feet; but any company supplying gas equal to 18 sperm candles, may demand for such gas a price not exceeding 6s. per 1000 cubic feet.

12. That the several companies shall, if requested by the consumers, supply fit and proper meters, and the charges which the companies shall make for the use of meters supplied by them, shall not exceed the following rents (to wit):—

For a 2-light meter at and after the rate of 2s. 8d. per annum.

3	,,	,,	,,	4	4	,,
5	,,	,,	,,	5	4	,,
10	,,	,,	,,	6	8	,,
20	,,	,,	,,	9	0	,,
30	,,	,,	,,	12	0	,,
45	,,	,,	,,	18	0	,,
60	,,	,,	,,	24	0	,,
80	,,	,,	,,	30	0	,,
100	,,	,,	,,	36	0	,,

For any meter exceeding a 100-light meter a sum equal to 10 per centum on the cost of such meter.

And for any meter less than a 100-light meter, and not being a meter above specified, a sum in due proportion to the sums above specified; provided always that the company shall not be bound to supply any meter exceeding a 60-light meter.—*Sec.* 96, *Sheffield Gas Act*, 1854.

13. No meter shall be affixed unless it has been tested by a competent officer, appointed by the Board of Trade, or by the justices in quarter sessions, and a proof-mark impressed thereon, such fees to be imposed as the Board of Trade or justices may fix; and each vestry or district board shall appoint one or more officers to report upon the due working of the public and private meters in the parish or district.

14. It shall not be lawful for any gas company to charge for the public lamps a higher price per 1000 cubic feet consumed, than the lowest price charged to any private consumer; and if any dispute shall arise between the gas company and any vestry or district board, as to the price to be charged for the public street-lamps, the question in dispute shall be settled by arbitration, in manner prescribed in the Land Clauses Consolidation Act, 1845, with respect to the settlement of disputes by arbitration.

15. That whenever any vestry or district board shall require any company to supply any portion of their parish or district within the limits of the company's Act, such

company shall be bound to lay down mains and pipes for the supply of such parish or district, provided the vestry or district board shall place and light public lamps at intervals not exceeding 100 yards along the roads or streets through which such mains are required to be laid.

16. Every company shall, within one year after the passing of this Act, cause a map to be made of the district within which any mains or district mains shall have been laid down or formed by them, on a scale not less than six inches to a mile, and shall cause to be marked thereon the course, situation, and diameter of all existing mains and district mains; and shall, within six months from the making of any alterations or additions, cause the said maps to be from time to time corrected, and such additions made thereto as may show the line and situation, and also the diameter of all such mains and district mains as may be laid down or formed by them from time to time after the passing of this Act; and such map, or a copy thereof, with the date expressed thereon of the last time when the same shall have been so corrected as aforesaid, shall be kept in the principal office of each company, and shall be open to the inspection of all persons interested in the same within the said district, who shall be at liberty to take copies of or extracts from the same.—*Metropolis Water Act*, 1852, *sec.* 17.

17. Every company, on the application of any person supplied with gas by such company, shall furnish to such person the particulars of any district main from which such person is supplied, together with the names of the streets through which such district main passes, and the commencement and termination thereof.—*Metropolis Water Act*, 1852, *sec.* 18.

18. With respect to the yearly receipt and expenditure of every company, the company shall in each year cause an account in abstract to be prepared of the whole receipt and expenditure of all rates or other moneys levied under the powers of their Acts, under the several distinct heads of receipt and expenditure, with a statement of the balance of such account duly audited and certified by the chairman of the company, and also by the auditors thereof, if any; and a copy of such annual account shall be sent, free of charge, to the town-clerk of the City of London, and to the vestry-clerk of each parish supplied with gas by each company respectively, not within the City of London, on or before the 31st day of January in each year, under a penalty of one hundred pounds for each default; and the copy of such account so sent shall be kept by the said town-clerk and vestry-clerk respectively, and shall be open to inspection by all persons at all reasonable hours; and any person shall be at liberty to inspect, copy, or take extracts from the same, on payment of one shilling for each inspection.—*Metropolis Water Act*, 1858, *sec.* 19.

19. Whenever it shall appear to the Board of Trade that any of the provisions of this Act have been violated, or have not been complied with on the part of any company, or that any company has acted or is acting in a manner unauthorized by the provisions of this Act, and it shall also appear to the said Board of Trade that it would be for the public advantage that the company should be restrained from so acting, the said Board of Trade shall certify the same to Her Majesty's Attorney-General, and thereupon the said Attorney-General shall proceed by information, or by action, bill, plaint, suit at law or in equity, or other legal proceeding, as the case may require, to recover any penalties which may have been incurred, or otherwise to enforce the due performance of the said provisions; and in case the default of the company shall consist in the commission of some act or acts unauthorized by law, then the said Attorney-General, upon receiving such certificate as aforesaid, shall proceed, by suit in equity or other legal proceeding, as the nature of the case may require, to obtain an injunction or order (which the judge in equity, or other judge to whom the application is made, shall be authorized and required to grant, if he shall be of opinion that the act or acts of the company complained of is or are not authorized by law) to restrain the company from acting in such illegal manner, or to give such other relief as the nature of the case may require.—*Metropolis Water Act*, 1852, *sec.* 20.

20. No such certificate as aforesaid shall be given by the said Board of Trade until twenty-one days after they shall have given notice to the company against or in relation to whom they shall intend to give such certificate of their intention to give such certificate; and no proceedings shall be commenced under the authority of the said Board of Trade except within one year after the offence shall have been committed.—*Metropolis Water Act*, 1852, *sec.* 21.

Price Current.

CASTINGS, PER TON.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 10 0	2 14 0	3 0 0	4 0 0	4 5 0
1¼ and 2 inches Socket-Pipes	7 15 0	7 0 0	7 5 0	7 10 0	7 5 0
2½ and 3 ,, ,,	7 5 0	6 15 0	7 0 0	7 5 0	7 0 0
4 and 5 ,, ,,	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0
6 in. and upwards ,,	7 0 0	6 5 0	6 5 0	6 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 15 0	...	6 15 0	7 0 0	6 15 0
,, 2nd ,, cold ,,	7 15 0	...	7 0 0	7 5 0	7 0 0
Tank Plates, ⅝ thick and above	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0

WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., perft.	1 8	1 0	0 10	0 7	0 5	0 4½
,, ,, ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
,, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets [Nipples	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	—

COALS, PER TON.

Newcastle.—Unscreened.		*Scotch Cannel.*	
Whitwell Primrose	6s. 3d.	Boghead, at Leith	32s. 0d.
Medomsley, Eighton Moor, and Burnhope	6 6	Kirkness, best	23 0
Pelaw	6 9	Capeldrae, 1st quality	20 0
New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth	7 0	,, 2nd ,,	12 6
Pelton	7 9	Lesmahago, at Glasgow	25 0
Ramsay's Newcastle Cannel	16 0	,, ,, Leith	27 6
		Arniston	22 0
		Wemyss	20 0
		Knightswood	18 0
		Pirnie	15 0

SUNDRIES.

Best Newcastle Fire-bricks	per 1000	60s. 0d.	
,, ,, ,, clay	per ton	12 0	
Cliff's Fire-bricks, at Wortley	per 1000	57 6	
Ingham's Fire-bricks, at Wortley	,,	55 0	
Tough Cake Copper	per ton £102 10s.	Foreign Spelter	per ton £22 5s.
English Pig Lead	,, 21 0	English Block Tin	,, 121 0
Welch Bar Iron, in London	,, 7 5	Banca	,, 124 0
Tarred Rope Yarn			per cwt. 26s. 0d.

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Coastwise—Newcastle.—Per Ton.		*Foreign.—Per Keel.*	
Chatham & Rochester	6s. 6d.	Boulogne	£8 5
Cork	9 0	Barcelona	22 0
Dover	—	Bordeaux	14 0
Dublin	9 3	Cadiz	15 0
Exeter Quay	9 0	Copenhagen	8 0
Folkestone	7 0	Dieppe	9 5
Hastings	—	Genoa	20 0
London	6s. 6d. to 6 9	Hamburg	10 0
Lowestoft	4 10½	Havre	10 7 6
Lynn	—	Leghorn	18 0
Portsmouth	8s. to 8 3	Lisbon	15 0
Plymouth	8 4½	Rotterdam	—
Whitstable	—	Stettin	8 0
Weymouth	—	Trieste & Venice	£21 to 24 0

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CROSLEY & GOLDSMITH'S

PATENT SELF-ADJUSTING & COMPENSATING GAS-METERS

CANNOT BE OVER OR UNDERCHARGED WITH WATER,

and they consequently register the quantity of Gas consumed with greater accuracy than Meters in which the Water-Line is variable.

MANUFACTURED BY

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

103, SOUTHWARK BRIDGE ROAD, LONDON.

N.B. The Patent Self-Adjusting and Compensating Apparatus may be applied to the ordinary Meter.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENT METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

REPORT ON CROSLEY AND GOLDSMITH'S PATENT METERS.

London, November 17, 1858.

Having been invited by Mr. William Crosley to examine the performance of the gas-meter recently patented by himself and Mr. Goldsmith, and manufactured by the firm of Crosley and Co., of 103, Southwark Bridge Road, we assembled at their manufactory, and now report the result of our examination.

We did not think it necessary to check the accuracy of the testing gasholder employed, as Mr. Barlow had done this on a prior occasion; and he assured us that he had found the index to agree, foot by foot, with a standard cubic foot measure containing 62·321 lbs. of distilled water, at the temperature of 62° of Fahrenheit and a barometric pressure of 30 inches, being the standard of measure established by law. Our first care, therefore, was to so adjust a 20-light experiment-meter that its registration coincided exactly with the index of the testing gasholder, which meter we subsequently used as the standard testing meter in the experiments hereinafter recorded, taking care from time to time to check its accuracy by the gasholder.

The chief novelty in Messrs. Crosley and Goldsmith's meter consists in an ingenious contrivance for maintaining the water at a uniform level, so that the capacity of the measuring-chamber shall not be affected by a deficiency or by an excess of water. It is well known that the registration of ordinary wet gas-meters, and more especially of the smaller sizes, is liable to considerable variation from this cause; and we consequently selected a 3-light meter for our first series of experiments, and commenced by subjecting it to the severest and most unfair test to which any meter can be put—that is, by adding lights till they commence to burn unsteadily. In this manner, a 3-light meter was tested with 10 lights, with the following results:—

EXPERIMENT *No.* 1.—3-*Light Patent Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
10	m. s. 30 23	25·36	25·00	1·44 slow	50·08	6·2

During the course of this experiment we added 10 cubic inches of water, without producing any appreciable effect upon the registration or upon the steadiness of the lights. We then reduced the number of burners to 3.

EXPERIMENT *No.* 2.—3-*Light Patent Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
3	h. m. s. 1 13 5	19·67	20·00	1·67 fast	16·15	1·8

We continued adding water by 5 cubic inches at a time during this experiment, till 20 cubic inches had been added in all, without flooding the syphon or altering the ratio of difference between the two meters; but with 45 cubic inches of water the syphon became flooded, and the lights were extinguished.

Our next experiment was with 1 light, by which means we obtained the results of experiments with the maximum and with the minimum rate of consumption of which this sized meter is capable.

EXPERIMENT *No.* 3.—3-*Light Patent Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
1	m. s. 50 0	4·91	5·00	1·83 fast	5·89	1·1

The extreme range of variation from absolute truth to which the meter is liable, is therefore between 1·44 per cent. slow and 1·83 per cent. fast, till the surplus-water reservoir is exhausted, when the meter becomes an ordinary one; but when it is borne in mind that this reservoir contains 54 cubic inches of water to compensate for evaporation—that some ordinary high-spouted 3-light meters are liable to variations to the extent of 60 per cent., according to the height of the water-line, and that the tolerated variation is 4 per cent at the adjusted water-line—it is evident that the objects aimed at by the inventors have been in a great measure successfully attained.

We continued our experiments by subjecting a 20-light meter to similar trials, commencing with 38 lights.

EXPERIMENT *No.* 4.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
38	m. s. 8 17	19·94	20·00	0·3 fast	144·4	1·75

We then added water till the syphon became flooded and the lights extinguished, which took place by the addition of 70 cubic inches of water. We then repeated the same experiment with 60 cubic inches of water, added after the overflow-plug had been replaced.

EXPERIMENT *No.* 5.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
38	m. s. 8 8	19·94	20·00	0·3 fast	147·0	1·75

It will be seen that the registration was not affected by the additional quantity of water; but, being desirous of trying the effect of passing a larger quantity of gas, and there being no means of burning more, we opened a cock leading into a chimney-flue by which the gas could escape.

EXPERIMENT *No.* 6.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
Not determined	m. s. 6 55	19·99	20·00	0·05 fast	173·4	2·25

It now only remained for us to ascertain the effect produced by reducing the consumption to a low rate; but, as the burning of 20 feet of gas through a single burner would have occupied several hours, we thought our object would be sufficiently accomplished by burning four lights.

EXPERIMENT *No.* 7.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
4	h. m. s. 1 6 40	19·87	20·00	0·65 fast	17·8	0·9

The surplus-water reservoir will hold 208 cubic inches of water, available to compensate for the waste by evaporation; and, as the meter will register correctly with a surplus of 60 cubic inches, there is ample provision both for the abstraction of water by evaporation and for an increase by condensation.

We also tested the effect of suddenly opening and closing the gas supply-cock, and found no inconvenience to arise on this head. The flow of gas was steady and uniform, and the pressure was not sensibly affected by the action of the pumping machinery.

Our experiments lead us to the conclusion that the patent meter is a practical and substantial improvement upon the ordinary wet gas-meter, inasmuch as the capacity of the measuring-chamber is not diminished by an excessive supply of water, nor can it be increased by drawing off water. On the one hand, therefore, the consumer is protected against any intentional or negligent overfilling of the meter, the result of which is to exaggerate the registered quantity of gas actually consumed; and, on the other hand, the gas manufacturer is protected against the fraudulent abstraction of water by the consumer, the effect of which in the ordinary meter is to cause it to register less gas than is really supplied. Time alone can determine whether these advantages are gained at the expense of its durability, or by any complexity which may render its utility doubtful; but, so far as we are able to form an opinion upon these points, the patent meters are not liable to any greater derangement than the ordinary wet meters, nor do we believe they will be less durable.

We ought to remark that these meters require to be adjusted and tested after being worked a short time under pressure, in order to give the pumping apparatus sufficient time to raise the water to the proper level in the measuring-chamber. Should this precaution have been neglected, the meter will register rather more than the correct quantity of gas supplied after that level has been attained; and this is an error into which persons who are accustomed to the testing of ordinary wet meters are liable to be led in testing the patent meters.

We have already condemned by implication the practice of transmitting more gas through a meter than it is intended to supply. That quantity is regulated by manufacturers generally upon the basis of 100 revolutions of the measuring-drum per hour, and any increase upon this speed is attended with such diminution in the effective pressure of the gas after it has passed the meter, that our having made experiments at greater speeds must not be taken as an expression of our approval of the system of propelling meters at three or four times their proper speed; on the contrary, we condemn it strongly, as involving an increase in the pressure at which the gas will have to be supplied in the mains, and a consequent augmentation in the leakage.

(Signed)

GEORGE LOWE, *C.E., F.R.S., Engineer-in-Chief to the Chartered Gas Company.*

JOHN KIRKHAM, *C.E., late Engineer-in-Chief of the Imperial Gaslight Company.*

GEDDIE PEARSE, *late Engineer-in-Chief to the Incorporated and Provincial British Gaslight Companies.*

THOMAS G. BARLOW, *Civil and Consulting Gas Engineer.*

CHARLES BOTTEN and SON,
ENGINEERS & METER-MAKERS,
CRAWFORD PASSAGE, RAY STREET,
CLERKENWELL, LONDON (E. C.).
Manufacturers of Station and Patent Protector Consumers' Meters, Patent Slide-Valves, Gas-Fittings, Pipes, &c.
Also, High-pressure Cocks, Hydrants, Closets, and all Water-Fittings.

EIGHTON MOOR GAS COALS.—Parties wishing to be supplied with these first-class Gas Coals will please to apply to Mr. MATTHEW NESBIT, EIGHTON MOOR OFFICE, NEWCASTLE-UPON-TYNE. These coals are well known as among the richest in gas, and working the roundest on the River Tyne. They are extensively used by metropolitan gas works.

WROUGHT-IRON Guides for Gas-holders.—Designs and Working Drawings for Trussed Wrought-Iron Guides and Frames can be obtained of CHARLES DIXON, C. E., Chichester, SUSSEX.

METROPOLITAN BOARD OF WORKS.
MAIN DRAINAGE OF THE METROPOLIS.
NORTHERN HIGH-LEVEL SEWER.
TO BUILDERS, CONTRACTORS, AND OTHERS.

THE Metropolitan Board of Works hereby give notice, that they will MEET at the Council-Chamber, Guildhall, in the City of London, on FRIDAY, the 17th day of December next, at Twelve o'clock at noon precisely, and will then be prepared to open TENDERS by parties who may be willing to CONTRACT for the CONSTRUCTION of MAIN BRICK SEWERS, 8 miles 4295 feet, or thereabouts, in length, and for the execution of other works in connexion therewith, to extend from the River Lea to Mansfield Road, Gospel-Oak Fields, near Hampstead; and for the maintenance of such works in complete repair for twelve calender months.

Plans, Sections, and a Specification of the Works, together with Forms of Tender, may be inspected, and other particulars obtained, at the office of the Board, No. 1, Greek Street, Soho Square, between the hours of Nine a.m. and Four p.m., until the 16th of December next.

The Engineer will attend at the Office of the Board on the 18th inst., at Twelve o'clock at noon, to afford further explanations to parties desirous of tendering, and to make arrangements for taking out the quantities.

Tenders, addressed to the Metropolitan Board of Works, must be delivered at the Office of the Board before Four o'clock on the 16th day of December next, and no Tender will be received after that hour.

The Board do not bind themselves to accept the lowest or any Tender, and the party whose Tender shall be accepted will be required to provide two approved sureties for the due performance of the works.

E. H. WOOLRYCH, Clerk of the Board.
No. 1, Greek Street, Soho Square, Nov. 10, 1858.

LESMAHAGO GAS COAL.

JAMES FERGUSON and CO., Lessees of the Auchinheath and Craignethan Gas Coal-fields (the most extensive and valuable in the parish of Lesmahago), respectfully intimate to the Managers of Gas-Works and Consumers of Gas Coal, that he is prepared to ship the best quality of the above well-known COALS at Glasgow or Leith; and also to deliver them at the railway stations upon, or connected with, the Caledonian Railway, to any extent which may be required.

Price, free on board, or delivered at the railway stations, may be learned by addressing James Ferguson and Co., Gas-Coal Works, Lesmahago.

Shipping Agent for Glasgow:
MR. ALEXANDER STRATTON,
159, WEST GEORGE STREET.

TO GAS COMPANIES.

WANTED, by the Advertiser, a Situation as MANAGER of a moderate sized Gas-Work. He has no objection to go abroad, if required, and can give most satisfactory references.

Address Y. Z., care of Mr. W. B. KING, 11, Bolt Court, Fleet Street, LONDON, E.C.

CARTER'S PATENT SAFETY GAS VALVES.

THOMAS LAMBERT and SON,
PATENTEES AND MANUFACTURERS,
SHORT STREET, NEW CUT, BLACKFRIARS, LONDON.

The Bank of England is fitted entirely with these Valves, from the smallest branch to the largest main pipe.

The following, among numerous Testimonials, will be found very satisfactory:—

"The British Gaslight Company's Office, No. 105, Broad Street, Ratcliff, London, June 10, 1846.

"Gentlemen,—In reply to your inquiry, I have to state that 'Carter's Patent Gas Valve' has been used by this company and by the fitters of the district extensively for seven years past. It was adopted to obviate the inconvenience of setting fast, so prevalent with the conical metal plug-cocks, and has been found to answer the purpose intended.

"I have recommended its use in several provincial towns with which I am professionally connected, and have not received any complaint of its having failed in any respect of performing satisfactorily all that is required of it.—I am, Gentlemen, yours respectfully,
"GEDDIE PEARSE.

"Messrs. Lambert and Son, Lambeth."

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas Works and Water Works.
Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

R. LAIDLAW and SON, Gas ENGINEERS,
Iron and Brass-founders, and Manufacturers of Cast-Iron Retorts, Condensers, Exhausters with Engines, Scrubbers, Purifiers, Station-Meters, Cast-Iron Tanks, Gasometers, Valves, Cast-Iron Pipes, &c.
Consumers' Meters, both wet and dry, of improved construction.
Internal Gas-Fittings of every description.
ALLIANCE FOUNDRY,
EAST MILTON STREET, GLASGOW.
LONDON OFFICE:
162, STRAND, NEAR SOMERSET HOUSE.

PADDON and FORD respectfully invite the attention of Gas Companies and Managers to their PATENT STREET LAMP REGULATOR, which ensures any required consumption.
By its use a great saving is effected, and the item of 'Unaccounted-for Gas" considerably decreased.

PADDON and FORD, Patent GAS-METER AND APPARATUS WORKS,
GRAY'S-INN-ROAD, LONDON,
Manufacturers of WET and DRY GAS METERS, STATION METERS, GOVERNORS, EXPERIMENTAL APPARATUS, LANTERNS, &c. &c.
Contractors for the erection or alteration of Gas-Works; and every description of Apparatus required in Gas-Works supplied.

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is prepared to supply Gas and Water Companies with Apparatus and Appliances of every description, including Cast and Wrought Iron Goods, Coals, Fire-Bricks, Retorts, &c. &c.
Any communications addressed to him as above shall have prompt attention.

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THROCKLEY,
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MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE BRICKS, CLAY RETORTS, LUMPS, TILES,
&c. &c.
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A large stock of Fire-Clay Goods always on hand in London, at the lowest wharf prices, at Messrs. CHRISTIE & Co.'s Wharf, 64, Bankside, SOUTHWARK.

CAST-IRON Retorts, Socket Pipes with Syphons and all requisite Connexions, Lamp Columns, Wrought Iron Tubing, Valves, Street Lamps, Sight Holes, Furnace Doors, Ash Pans, Charging and Coke Shovels, Iron Pails and Coke Barrows, Cross Bars, Fire Pots, Pumps, Iron Borings.
PURIFIERS, CONDENSERS, and SCRUBBERS erected complete, or the materials supplied; with every description of goods in use by Gas-Works, in stock, on wholesale prices, at
LYNCH WHITE'S,
Old Barge Iron Wharf, Upper Ground Street,
LONDON.

TO GAS COMPANIES.

J. W. GRAZEBROOK, 75, Old BROAD STREET, LONDON,
Having applications for New and Second-hand Gas Apparatus, would be obliged by those Companies having Apparatus to dispose of, to send particulars. And Companies requiring Apparatus are solicited to apply.
PIPES, RETORTS, TANKS, GASHOLDERS, &c. on Shortest Notice.
STOURBRIDGE and NEWCASTLE FIRE GOODS CONTRACTS TAKEN.

RICHARDSON and CO., ENGINEERS AND IRONFOUNDERS,
TUNNEL FOUNDRY AND SPRING GARDEN IRON-WORKS,
DUDLEY, near BIRMINGHAM,
Manufacturers of Gas and Water Apparatus, Steam-Engine Boilers, Single and Double Gasholders, Tanks, Bridges, Boats, Roofs, Valves, &c.

WEST and GREGSON, Gas-Meter MANUFACTURERS, &c.
UNION STREET, OLDHAM.
Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.
W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

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FIRE BRICKS OF EVERY DESCRIPTION, SHAPE, AND SIZE, &c. &c.
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These RETORTS are generally used in the Gas-works of Preston, Accrington, Bury, Heywood, Middleton, Rochdale, Ratcliffe; the Mills of Messrs. Horrocks, Miller, and Co., Preston, &c. &c., and are unequalled in having afforded general satisfaction to those who have given these Retorts a trial.
To meet the increasing demand, the Works at Little Harwood have been greatly enlarged; and Gas Engineers who may favour with an Order may rely with confidence on their being promptly supplied with an article not to be surpassed in finish or durability.
PRICES MODERATE.

TO GAS COMPANIES, GAS PROPRIETORS, AND GAS ENGINEERS.
JOHN VICKARY

begs to call the attention of the above to his improved METALLIC CASE GAS-METER, an improvement which has met with entire approbation from the various Gas Companies and Engineers to whom he has introduced it, and acknowledged to be the greatest improvement that has been made since the year 1832; at which period a metal was introduced for the construction of the Drum, Syphon, and Float, capable of resisting any impurities arising from either gas or water, which has been found to answer every expectation; as, in repair, Drums of the above date are found in perfect and good condition, when the Outer Case, Valve-box, Inlet-pipe, &c., are quite destroyed and entirely past repair.
J. V. has introduced a coating or lining of the above metal in the Outer Case, Valve-box, Inlet-pipe, &c., thereby rendering the whole as durable as the Drum, as not a particle of tin plate is exposed to the action of either water or gas; and preventing the possibility of gas passing above the water line through the front into the body of the Case to the outlet unregistered, which frequently occurs. When the Meter has been in use for any length of time it is generally found that rust or decay takes place *above* rather than under the water line, which is only discovered when they need repair. Also the Inlet-pipe and Valve-box are generally found quite decayed, which cannot happen in the above improvement.
J. V. feels confident that the above will be found a most desirable and perfect instrument, as it contains all other improvements of utility that have been introduced up to the present time.
The most strict attention is given to the workmanship as well as the registration of every Meter, to render them perfectly accurate.
Station Meters, Governors, &c., made on the shortest notice, as well as Gas Cooking Apparatus of every description, Gas Baths, &c.
Meters sent at the lowest London prices.

Carriage paid to any part of England.

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MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) has the satisfaction to announce that Gas may now be purified in a manner that combines unusual commercial advantages with all the possible requirements of the sanitary officer and the public. All that need be said to call attention to the new process is, that instead of the purifying-house, two vessels of small area, placed after the condenser, suffice; that these vessels never have the least communication with the atmosphere; and that neither lime, oxide, nor any other substance foreign to the gas itself is brought into contact with it. Gas engineers will perceive among the advantages thus offered, economy in room, labour, and materials; impossibility of nuisance; and total absence of injury to the illuminating power.

Particulars by addressing RICHARD LAMING, 118, FENCHURCH STREET.

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IRON TANKS for Gasholders, Railway Stations, &c.
GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.
GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contractor for Gas Works of any Magnitude. Designs, Specifications, and Estimates furnished.
WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.
IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.
PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

NO CHIMNEY WANTED FOR
RICKETS'S PATENT CALORIFERE GAS STOVES,
IN CHURCHES, HALLS, OR SHOPS;
And for Conservatories, or any close apartment, a pipe can be attached to convey away the burnt air.
RICKETS'S CHEAP GAS STOVE,
Price £1. 15s.,
Made of sheet-iron, suitable for heating small Counting-houses, Bed-rooms, Cellars &c. &c.
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JOHN ROGERSON and CO.,
NEWCASTLE-ON-TYNE & MIDDLESBRO'-ON-TEES.
Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.

BRYAN DONKIN and CO.'s improved GAS VALVES have been adopted by numerous Gas Companies in England and abroad, and their advantages and great security fully proved. Very large numbers are in use. Prices from 11s. 6d. to 13s. 6d. per inch diameter.
BRYAN DONKIN and Co.,
Engineers, near Grange Road, BERMONDSEY.

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DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.
FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.
RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.
Illustrated circulars, giving references and every information, may be obtained on application as above.

By Her Majesty's Royal Letters Patent.

JAMES MEACOCK,

PATENT DRY and IMPROVED WET GAS-METER WORKS,

7, SNOW HILL, AND 16, WEST STREET, LONDON.

ESTABLISHED 1836.

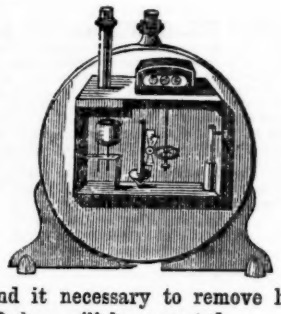
J. MEACOCK begs to call attention to his patent method of securing the Leather diaphragm of his Dry Meter. Instead of using the soldering iron for this purpose, it is held between two flat Metal Rings, and screwed up sound to a metal frame, as shown in the drawing.

By this improvement the perishing effect of hot tools to leather being avoided, its durability must be longer; also, its repair when needful is most simple, as a new leather diaphragm can be applied by merely unscrewing the old one from the rim or frame to which it had been screwed up.

Meters of Gas Companies being subject to so much wear and tear, J. M. begs leave to assure those who may honour him with their commands, that nothing but the stoutest materials for cases, the hardest gas-resisting metals, and best foreign leather for the interiors, will be used, and none but first-class workmen employed in their construction.

Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

METERS SENT ON APPROVAL.



In consequence of the great demand for the above Meters, J. Meacock has found it necessary to remove his Manufactory to more extensive Premises, 16, West Street, Smithfield, where Orders will be executed on the shortest notice.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

WHITEHOUSE and CO., Boiler and GASHOLDER MAKERS,
GLOBE PATENT TUBE WORKS,
WEDNESBURY,
Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.
Orders promptly executed.

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VOL. VI. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1857, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., and V. are still on sale.
W. B. KING, 11, Bolt Court, Fleet Street.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn Hill, begs to inform Managers of Gas-Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

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Invested Capital exceeding £2,000,000 Sterling.
This Society is one of the very few purely Mutual Insurance Offices, the whole of the profits being divided among the Policy holders.
The rates are considerably below those usually charged. Thus, at the age of forty, the sum of £32. 19s. 2d., which at the ordinary premium will insure £1000, with the NORWICH UNION WILL INSURE £1095. 4s., giving an immediate Bonus in addition to subsequent accumulations.
Annuities and Special Risks undertaken on favourable terms.
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TO THE GAS COMPANIES
OF GREAT BRITAIN AND THE CONTINENT.
CANNEL AND COAL FOR GAS PURPOSES.—Fifteen years' connexion with one of the largest Gas Concerns in England, enables us from practical experience to certify that the CANNEL and COAL we offer are those best suited for Gas purposes.
On application, we shall have much pleasure in forwarding our Tabulated Statements of Analyses, with Prices and Terms; also References as to respectability.
All Contract Orders have our careful and best attention.
EMANUEL TURNER and Co., Exporters of Cannel and Coal, 34, Castle Street, LIVERPOOL.

HARRIS and PEARSON,
PROPRIETORS OF
BEST CLASS-HOUSE POT AND CRUCIBLE CLAY.
MANUFACTURERS OF
FIRE BRICKS GAS RETORTS &C.
AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.
Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

BENJAMIN GIBBONS, Jun.,
DEEPDALE FIRE-CLAY & BRICK WORKS
Near DUDLEY,
Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.
FIRE-CLAY RETORTS,
TO MODEL OR DRAWING.
B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.
References given, if required.

CEMENT.
G. and T. EARLE, Hull, beg to draw the attention of Gas and Water Companies, Engineers, and Contractors, to their Light Cement, for Stuccoing and Building Gasholder Tanks, and Jointing Iron Pipes, for which purposes it will be found a very superior article.

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

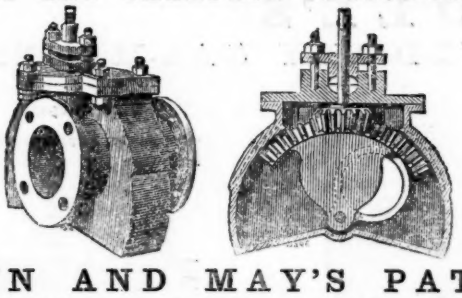
THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

M. B. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.

BEST AND CHEAPEST SLUICE-COCK.



BROWN AND MAY'S PATENT.

Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.

Can be taken to pieces without being removed from the line of Piping.

NORTH WILTS FOUNDRY, DEVIZES.

Wholesale Agents, Messrs. S. and E. RANSOME, 31, Essex Street, Strand, E.C., Where a Sample may be seen.

WILLIAM PARKINSON AND CO.,

(Successors to the late Samuel Crosley,)

COTTAGE LANE, CITY ROAD, LONDON,

Beg to announce that, in addition to the manufacture of GAS-METERS, they continue the manufacture of METERS for MEASURING WATER, SPIRITS, &c., commenced, under Patent in 1849, by the late Mr. William Parkinson.

These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

JOHN BENT, Manufacturer of

GAS-METERS,
283, BELL BARN ROAD, BIRMINGHAM,
(Established 1830),

Begs respectfully to call the attention of Gas Companies, Engineers, &c., to his WET GAS METER, made upon the most improved principles, the most admirable materials, and warranted to register correctly.

"ALL DOUBTS REMOVED."

DEFRIES' celebrated Dry Gas-METERS, of which there are 80,000 in use in Palaces, Churches, Chapels, Royal Dock-yards, Club Houses, Public Offices, and other buildings throughout the Empire, the Continent, and Colonies.

His meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that building was destroyed by fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company and found inflexibly correct.

On the 9th of June, 1858, at the Western Gas Company, his meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests, from the full lighting down to a single jet, and in each case, as in numerous other instances, accuracy was finely indicated.

His two large meters at the Thames Tunnel have been in constant use day and night for upwards of twelve years (one continuation of dark hours), subjected to the wear and tear of 75 years, as compared with the ordinary hours of using gaslight above ground.

Gas Companies honouring Mr. Defries with their commands for his PATENT DRY METER, which has done so much service in simplifying the fitting up of gas, as well as checking surreptitious burning, will be guaranteed perfection for five years free of charge.

Defries' Prize-Medal Gas Baths, Gas-Cooking and Heating Stoves. The Polytechnic Gas Fire, with indestructible fuel, in daily operation (Saturday excepted) at the Office, 145, REGENT STREET, and the Manufactory, Euston Road, Fitzroy Square, LONDON.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents: CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

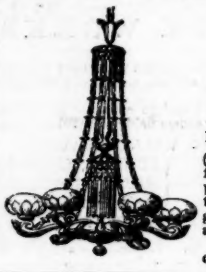
A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.'s Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

ALEXANDER WRIGHT,

GAS ENGINEER, MANUFACTURER OF GAS-METERS, GOVERNORS, AND EVERY DESCRIPTION OF GAS APPARATUS,
55, MILLBANK STREET, WESTMINSTER.
CONSUMERS' METERS at the List Price, with a Liberal Discount to Wholesale Purchasers.
THOMPSON'S BROMINE TEST, £1. 1s.—BROMINE, 3s. per Ounce.
BISULPHURET OF CARBON TEST, £2. 2s.
APPARATUS FOR DETERMINING THE HEATING POWER OF SAMPLES OF COAL AND OTHER DESCRIPTIONS OF FUEL, £5. 5s.,
INVENTED BY LEWIS THOMPSON, ESQ., M.R.C.S.
REGISTERING PRESSURE GAUGE, Net Price, £8. Glass Shade, 10s. extra.
STATION METERS, PRESSURE GAUGES, PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, &c.

JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast Iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, Lamp Columns of various patterns, &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
CHARLES HORSLEY, Agent.
C. H. is prepared to carry out the warming and ventilation of public buildings, &c.; also civil engineering in general.

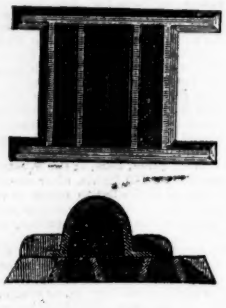


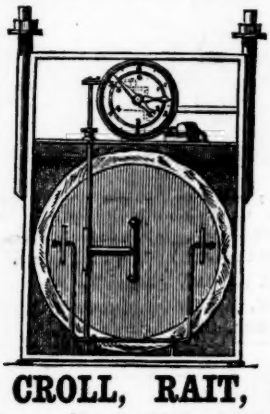
F. & C. OSLER,

44, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards (Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

CROLL'S
PATENT IMPROVED DRY GAS-METER,

NEW VALVE.





OLD VALVE.

Manufactured by CROLL, RAIT, and CO., LONDON.

FACTORY—Blundell Street, near the Railway Station, Caledonian Road, N.
OFFICES—10, Coleman Street, City, E.C.

Messrs. CROLL, RAIT, and Co. beg to call the attention of Gas Companies to their Improvements in Dry Gas-Meters, which secure a steady light under all circumstances.

In forming the Valve-Seat of the Dry Gas-Meter it has hitherto been usual for the Bars to be equal in width to the openings; but, by the extent of the surfaces thus brought into contact with the Valve or Cover, it is found that fluid accumulates, and, during part of the motion of the Valve, partially closes the passage, thereby causing an oscillation in the lights.

An Improvement in the Manufacture now introduced and patented by Mr. CROLL consists of very considerably reducing the width of the Surfaces or Bars, as in the drawing of the New Valve, retaining only such width of bar as is necessary to secure correct measurement.

Another Improvement consists in the mode used of mixing and amalgamating the various proportions of Metals for the Valve, always taking care that the Valve-Seat shall be of an alloy considerably different to that of the Valve-Cover, by which the friction of the surfaces is materially lessened.

These Improvements remove at onee any liability to unsteadiness of light, and at the same time secure (from the Valve working more evenly) a greater certainty of accurate registration.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,
invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.
MANUFACTURERS OF
GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;
DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.
IMPROVED FULL-WAY CARTER'S VALVES (much approved of);
GAS-STOVES, and every article connected with Gas Apparatus.
CAST & WROUGHT-IRON PIPE, BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.
D. HULETT'S IMPROVED SERVICE CLEANSER
for clearing out Mains, Services, and Interior Fittings—60s. net.
Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.
Sole Manufacturers of Church and Mann's Photometer.
Large Pattern Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Joseph Clayton, 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, December 7, 1858.